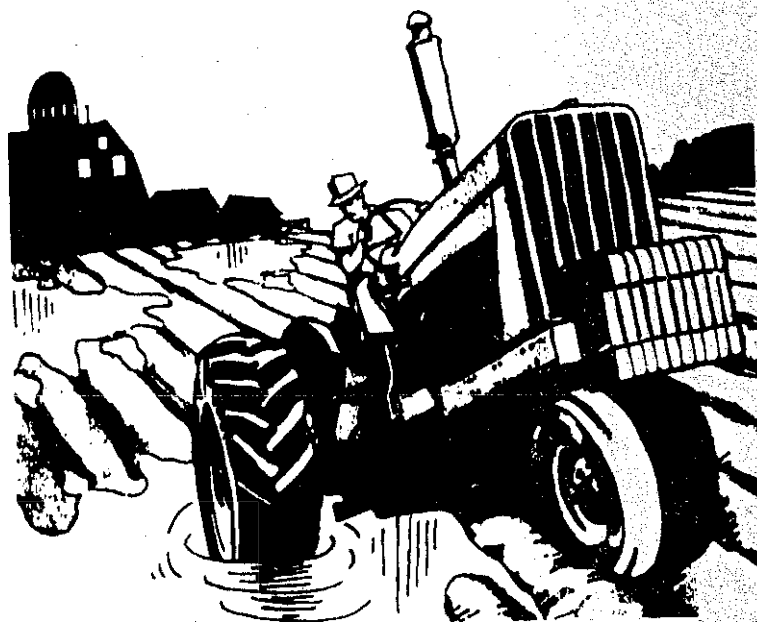


# ***DRAINAGE RESEARCH MINER INSTITUTE -1978***

## ***SOIL and CROP RESPONSES***

F. N. Swader  
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Agronomy Mimeo 80-36  
AE Res 80-32  
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Report 80-05

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This publication is a report of the multidisciplinary research project, Soil and Water Management for Increased Crop Production in Northern New York (Hatch 498). This is a cooperative project involving the Departments of Agricultural Engineering, Agricultural Economics, and Agronomy at the College of Agriculture and Life Sciences. The respective cooperators are R. D. Black and L. D. Geohring, R. A. Milligan, and F. N. Swader and L. A. White, Jr. The field data were collected by personnel of the Cornell-Miner Project, under the on-site supervision of Mr. David H. Wilson.

This is the second report on the research into soil and water management for increased crop production in Northern New York. A previous report for 1977 was published as Agronomy Mimeo 78-21.

## Hatch 498

## Drainage Research - Miner Institute - 1978

## CROP MANAGEMENT AND YIELDS

F. N. Swader and L.A. White, Jr.

This report covers the second year of a project (Soil and Water Management for Increased Crop Production in Northern New York, Hatch 498) designed to reflect the effects of improved drainage on crop yields. The project is comprised of fields 3I-1, 3I-2, and a field at Lake Alice. The general locations are shown in Fig. 1.

The Lake Alice site is managed as a control treatment both with respect to intensive cropping (and drainage improvement) and with respect to an optimum cropping system (without drainage improvement). The yield subplots and soils are shown in Fig. 2.

The west half of the area constitutes the control for the drainage treatments, and is cropped (as much as possible) like fields 3I-1 and 3I-2. It should have been planted to corn in 1978, but it was not because it remained too wet to plant until too late in the season. Sudangrass was planted as a substitute at the discretion of the farm manager, and as a common substitute or emergency crop.

The east half is considered as a control for a traditional (non-intensive, non-drained) situation. The area is currently being managed and harvested as a "native meadow" with a wide variety of grass and sedge species present. It has had no tillage operations for at least 15 years. The grass is harvested as hay, and only the gross yields have been recorded (there have been no yield subplots established).

Field 3I-1 is a comparison of sub-surface drainage systems with two drain spacings (50 and 100 feet) in 4 distinct soil types. The field plan and plot locations are shown in Figures 3 and 4-7.

Field 3I-2 is a comparison of surface drainage treatments, as indicated in Fig. 8.

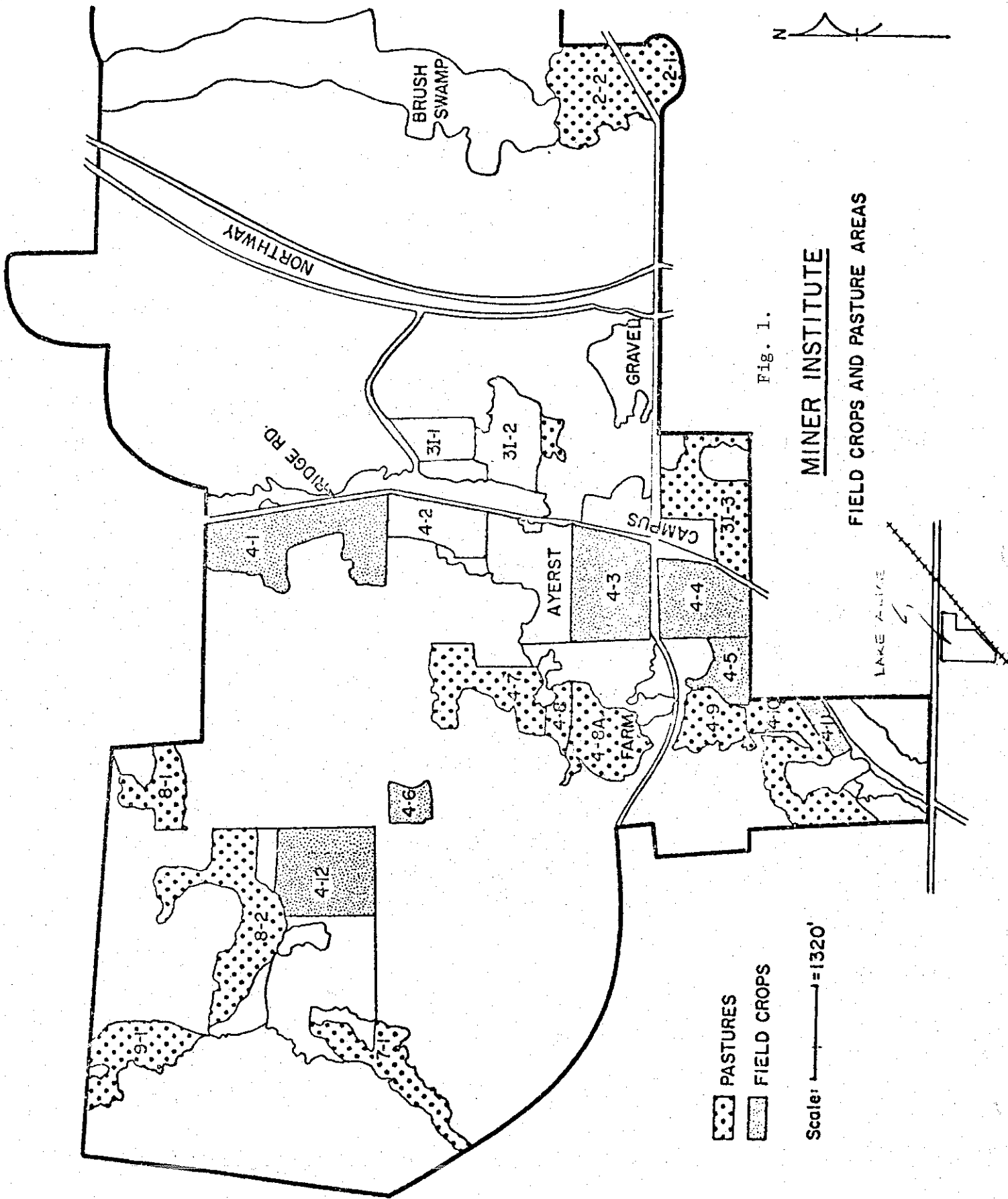


Fig. 1.

**MINER INSTITUTE**  
**FIELD CROPS AND PASTURE AREAS**

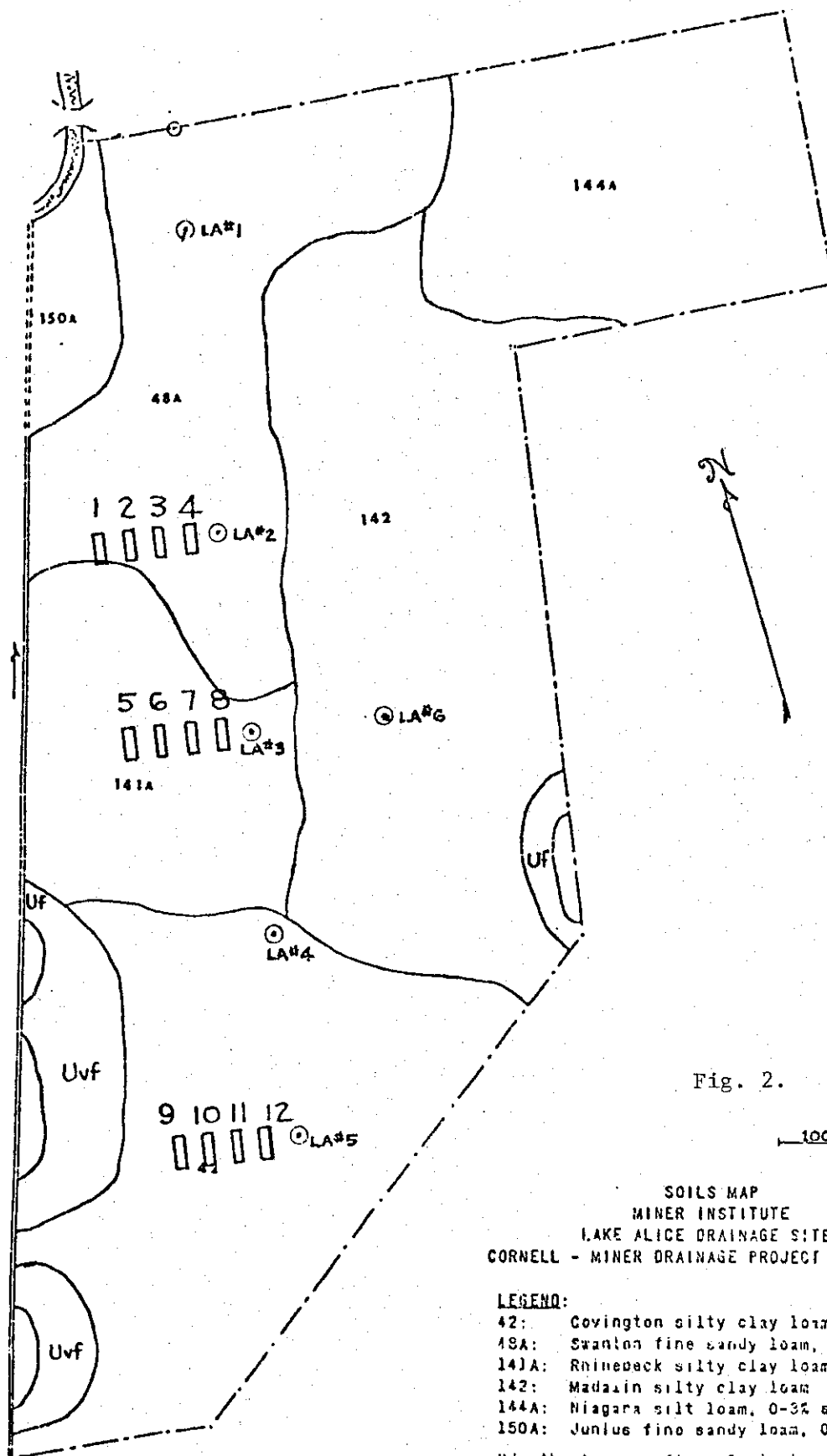


Fig. 2.

100 ft

SOILS MAP  
MINER INSTITUTE  
LAKE ALICE DRAINAGE SITE  
CORNELL - MINER DRAINAGE PROJECT (HATCH )

## LEGEND:

- 42: Covington silty clay loam
- 48A: Swanton fine sandy loam, 0-3% slopes
- 141A: Rhinebeck silty clay loam, 0-3% slopes
- 142: Madalin silty clay loam
- 144A: Niagara silt loam, 0-3% slopes
- 150A: Junius fine sandy loam, 0-3% slopes

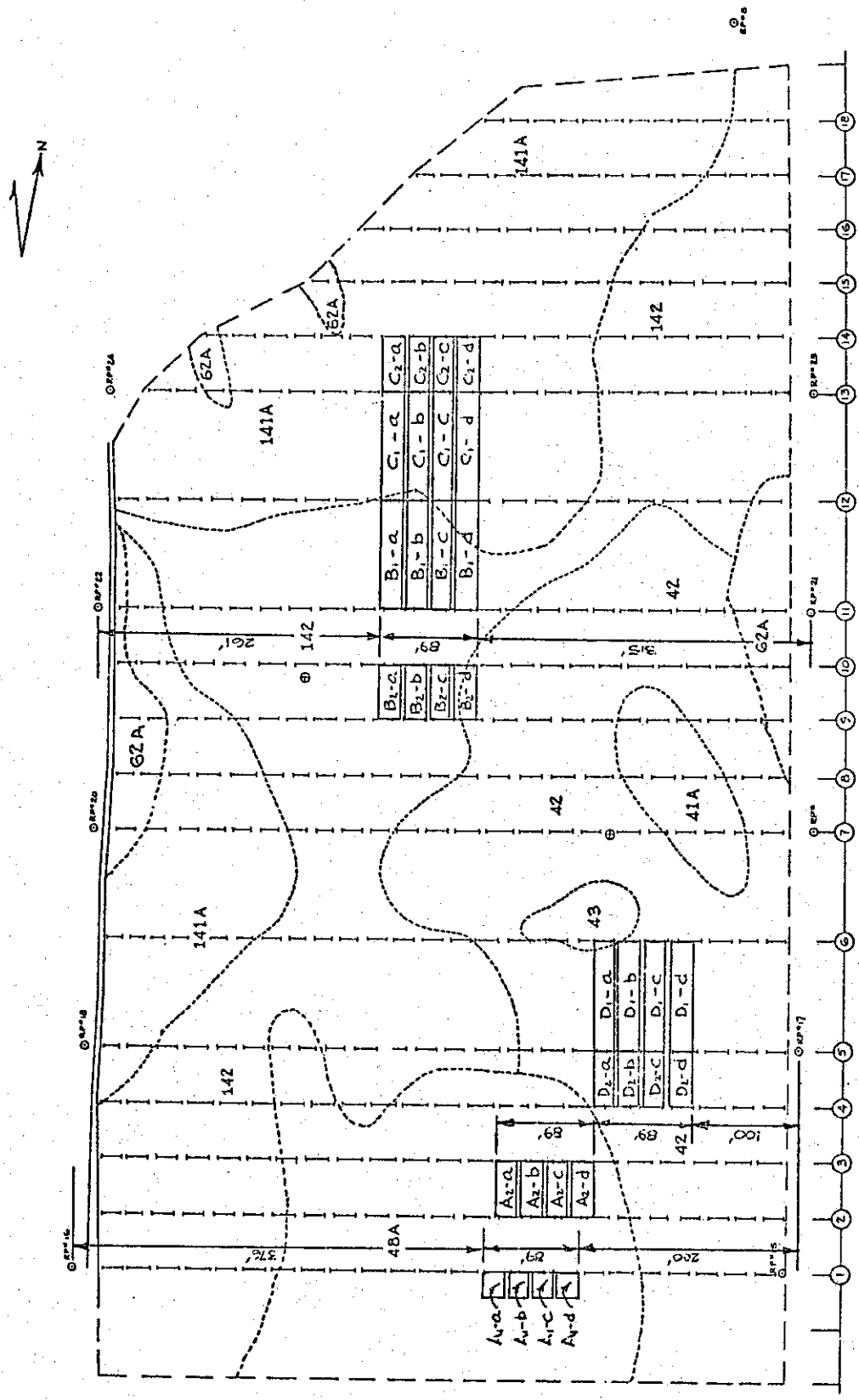
Udorthents very fine: Covington B&C horizons  
dug out to make ponds

Udorthents fine: Rhinebeck or Madalin B&C  
horizons dug out to make ponds.

Soils mapped by F. Z. Hutton, Jr. JULY 1976  
Graded by S. A. Barrows

LA#1 APPROXIMATE LOCATION OF  
WATER TABLE PIPE

5  
39"x20' SUB-SAMPLE PLOTS



MINER INSTITUTE FIELD 31-1

SOILS MAP

(REVISED 6/78)

Scale: 0 50 100 FT.

RP dentatus Reference Point - 3/4" IRON PIPE  
X 6 FT. LONG DRIVEN INTO GROUND.  
(F.B. p.47)

Fig. 3.

Fig. 4.

## A SUBPLOTS

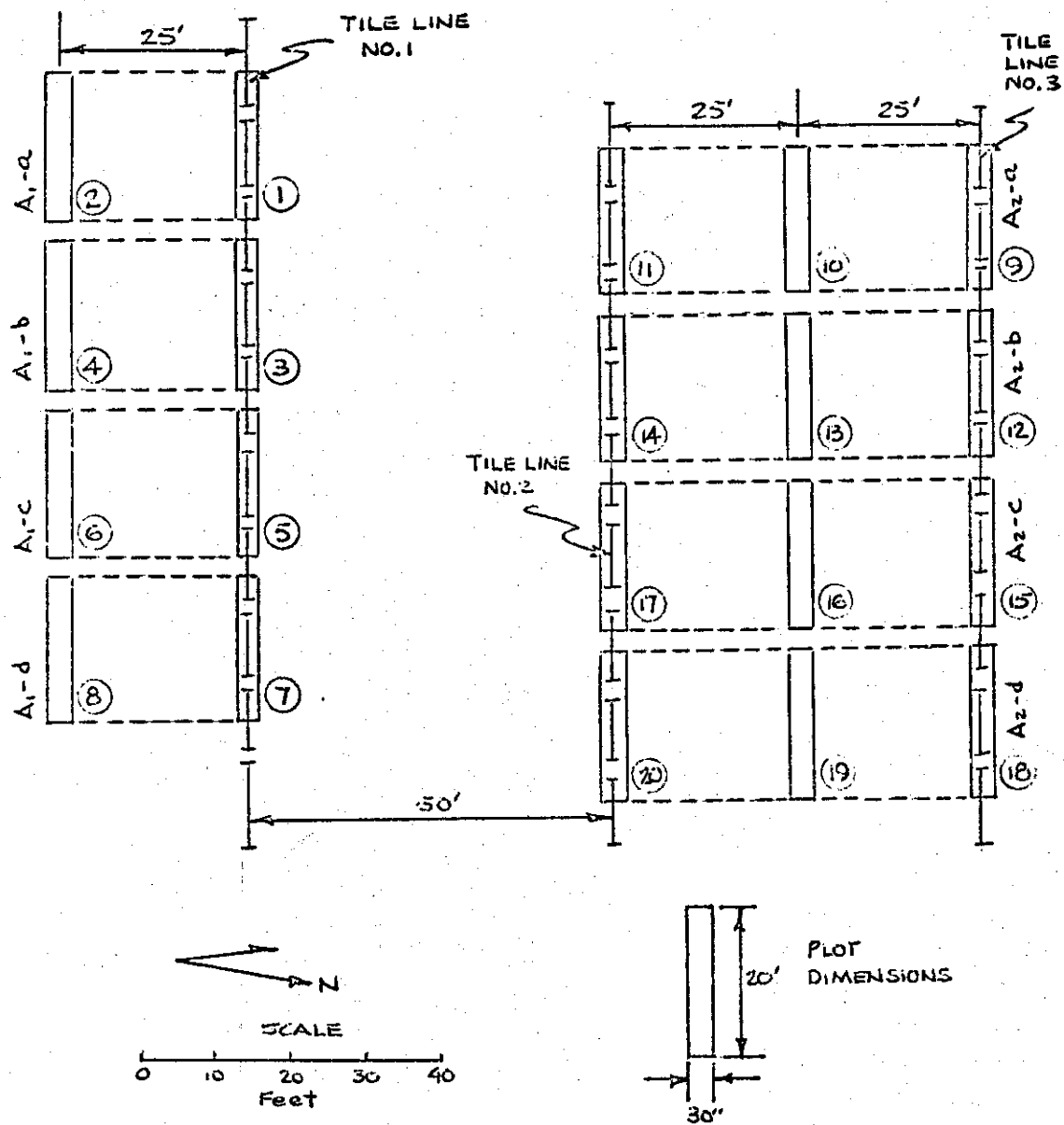


Fig. 5.

## B SUBPLOTS

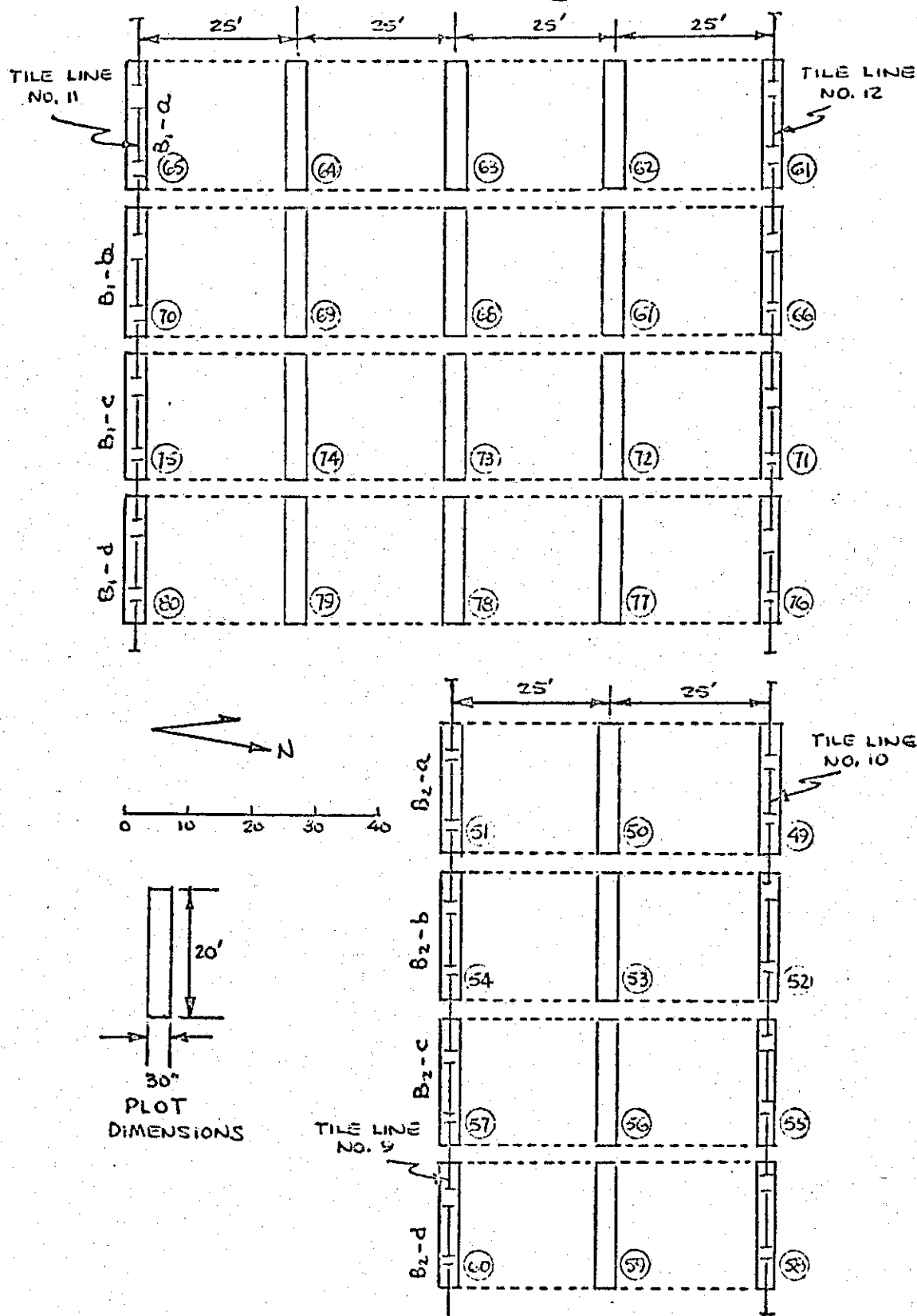




Fig. 6.

## C SUBPLOTS

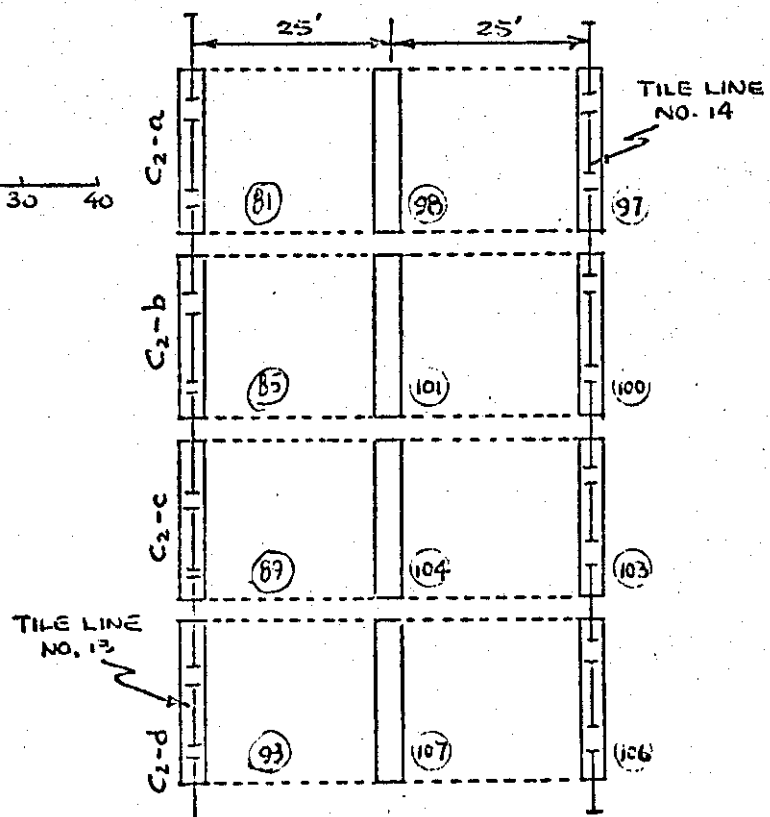
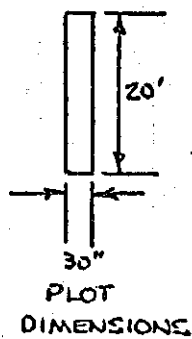
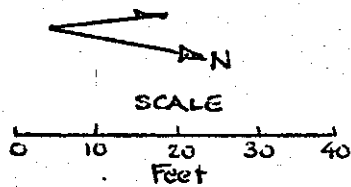
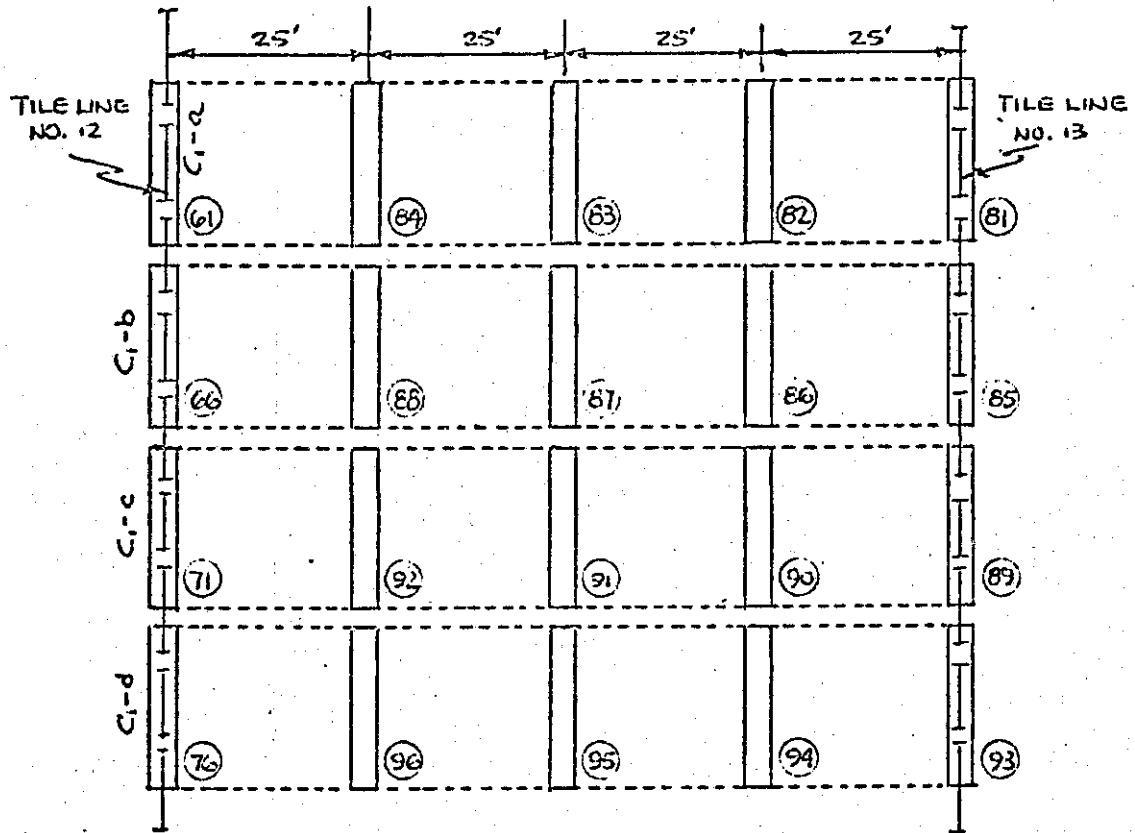


Fig. 7.

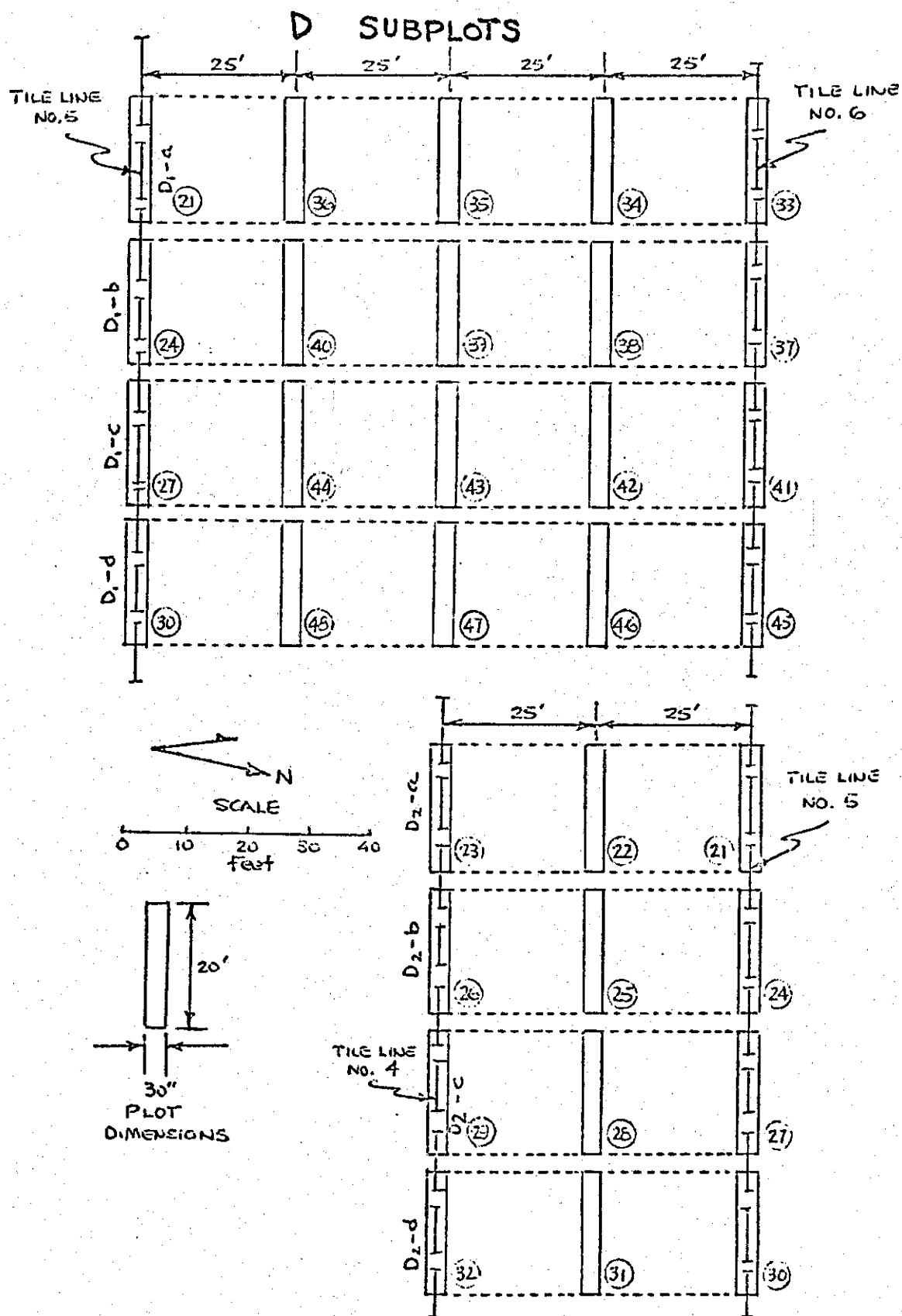




Fig. 8. Field Subplots, Hatch 498, 1978. Field 3I-2.

Cultural Practices & Yields

## I. Lake Alice -

## A. Sudangrass

Tillage: Chisel plowed (once); disked 3 times

Pesticides: 4 lb/A Aatrex; 2 applications of 2 lbs/A

Fertilizer: 0-0-60; 200 lb/A - broadcast on 7/11/78.

10-10-10; 200 lb/A - at planting,

34-0-0; 150 lb/A - topdressing (Ammonium Nitrate), 7/12/78

Planting: Sudangrass, var. "Piper." 35 lb/A - planted 6/29/78

Harvest: Plots harvested by hand, August 23, 1978.

field harvested with field machinery. All yields were weighed.

## Yields

Table 1. Sudangrass Yields, Lake Alice, 1978

Sudangrass, T/A (@65% moisture)

Soil: Swanton fine sandy loam

| Plot No:     | 1    | 2    | 3    | MEAN | S            |
|--------------|------|------|------|------|--------------|
| Silage Yield | 4.28 | 3.52 | 4.33 | 3.92 | <u>+0.44</u> |
| (T/A)        |      |      |      |      |              |

Soil: Rhinebeck silty clay loam

| Plot No:     | 5    | 6    | 7    | 8    | MEAN | S            |
|--------------|------|------|------|------|------|--------------|
| Silage Yield | 4.93 | 4.06 | 2.92 | 2.44 | 3.59 | <u>+1.12</u> |
| (T/A)        |      |      |      |      |      |              |

Soil: Covington silty clay loam

| Plot No:     | 9    | 10   | 11   | 12   | MEAN | S            |
|--------------|------|------|------|------|------|--------------|
| Silage Yield | 0.86 | 2.88 | 3.65 | 2.68 | 2.52 | <u>+1.18</u> |
| (T/A)        |      |      |      |      |      |              |

Total 1978 sudangrass silage production = 7.15 tons @ 65% moisture.

## B. Native Meadow

Tillage: None

Pesticides: None

Planting: None

Fertilization: 0-0-60; 200 lb/A broadcast on 7/11/78

34-0-0; 150 lb/A broadcast on 7/12/78

Harvest: Field equipment, as dry hay (mow-rake-bale). Hay weights recorded.

Yields: 4.1 tons of baled hay from 5.5 acres, or 0.75 T/A of baled hay

## II. Field 3I-2 (Surface drainage) - Corn

Tillage: chisel plowed (once), disked once

Pesticides: 4 lbs/A Aatrex; 2 (split) applications of 2 lbs/A. 1 lb/A Furadan (a.i.) at planting

Fertilizer: 0-0-60; 200 lb/A (broadcast) prior to planting

13-52-0; 135 lb/A at planting

32-0-0; 180 lb/A sidedressed (32% Nitro)-60 lbs/A of N.

Planting: Corn, Pioneer 3958. Planted; 5/11/78

Harvest: Harvested with field equipment; all loads were weighed and recorded. Field areas were divided as shown in Fig. 8, which shows dimensions, calculated acreages, and soil types.

## Yields

Table 2. Corn silage, T/A (@ 70% moisture), Field 3I-2, 1978.

|                  |      |         |              |           |         |           |
|------------------|------|---------|--------------|-----------|---------|-----------|
| Soils: Rhinebeck |      | Swanton |              | Niagara   | Madalin | Rhinebeck |
|                  |      |         |              | Swanton   | Swanton | Madalin   |
| Madalin          |      | Madalin | Madalin      | Rhinebeck | Whately | Whately   |
| Plot No.         | 1A   | 1B      | 2A           | 2B        | 3A      | 3B        |
| Drainage         |      |         | Smoothed and |           |         |           |
| Treatment        |      |         | Smoothed     |           | Graded  |           |
| Silage Yield     | 21.4 | 22.4    | 15.4         | 16.2      | 15.0    | 11.7      |
| (T/A)            |      |         |              |           |         |           |

Total 1978 silage production: 314.6 tons (70% moisture) or an average of 17.4 tons/acre.

### III. Field 3I-1 (Subsurface drainage) - Corn

Tillage: Chiselled lightly (once) over the tile lines (E-W)

Entire field chiselled (N-S), disked once.

Pesticides: 4 lbs/A Aatrex; 2 (split) applications of 2 lb/A  
1 lb/A Furadan (a.i.) at planting

Fertilizer: 0-0-60; 200 lb/A (broadcast) before planting

13-52-0; 135 lb/A at planting

32-0-0; 180 lb/A sidedressed (32 % Nitro) - 60 lbs/A of N

Planting: Corn, Pioneer 3958. Planted 5/10/78

Harvest: Subplots: 5 x 20 feet. One 20-ft row was hand-picked to obtain grain yield data, then chopped to obtain stover yield data.  
One 20-ft row chopped mechanically to obtain silage yield data.  
Subplot designations and locations are shown in Figures 3-7.

#### Yields:

##### A. 50 foot drain spacing

Table 3. Mean Silage Yields, T/A (70% moisture), Field 3I-1, 1978.

| Plot Area <sup>1/</sup> | Soil           | Treatment <sup>2/</sup> |                   |                   |
|-------------------------|----------------|-------------------------|-------------------|-------------------|
|                         |                | A                       | B                 | C                 |
| A <sub>2</sub>          | Swanton fsl    | 26.5 <sup>a3/</sup>     | 24.3 <sup>a</sup> | 25.0 <sup>a</sup> |
| B <sub>2</sub>          | Madalin sicl   | 19.8 <sup>a</sup>       | 22.8 <sup>a</sup> | 22.8 <sup>a</sup> |
| C <sub>2</sub>          | Rhinebeck sicl | 21.5 <sup>a</sup>       | 22.2 <sup>a</sup> | 19.5 <sup>a</sup> |
| D <sub>2</sub>          | Covington sicl | 19.5 <sup>b</sup>       | 21.2 <sup>b</sup> | 24.8 <sup>a</sup> |

Table 4. Mean Grain Yields, Bu/A (15% moisture), Field 3I-1, 1978.

| Plot Area <sup>1/</sup> | Soil           | Treatment <sup>2/</sup> |                     |                    |
|-------------------------|----------------|-------------------------|---------------------|--------------------|
|                         |                | A                       | B                   | C                  |
| A <sub>2</sub>          | Swanton fsl    | 178.5 <sup>a3/</sup>    | 168.0 <sup>a</sup>  | 174.4 <sup>a</sup> |
| B <sub>2</sub>          | Madalin sicl   | 142.0 <sup>a</sup>      | 164.4 <sup>a</sup>  | 164.8 <sup>a</sup> |
| C <sub>2</sub>          | Rhinebeck sicl | 160.7 <sup>a</sup>      | 165.8 <sup>a</sup>  | 147.7 <sup>a</sup> |
| D <sub>2</sub>          | Covington sicl | 134.6 <sup>b</sup>      | 156.0 <sup>ab</sup> | 168.1 <sup>a</sup> |

<sup>1/</sup> See plot location maps (Figures 4-7).

<sup>2/</sup> Treatments are distances (in feet) from the drain line: A = 0 feet, B = 25 feet, C = 0 feet.

<sup>3/</sup> Means superscripted by the same letter are not significantly different at P = 0.05 (Duncan's Multiple Range Test).

B. 100-foot drain spacing:Table 5. Mean Silage Yields, T/A (70% moisture), Field 3I-1, 1978

| Plot Area <sup>1/</sup> | Soil           | Treatment <sup>2/</sup> |                    |                     |                   |                    |
|-------------------------|----------------|-------------------------|--------------------|---------------------|-------------------|--------------------|
|                         |                | A                       | B                  | C                   | D                 | E                  |
| A <sub>1</sub>          | Swanton fsl    | 24.3 <sup>a3/</sup>     | 27.2 <sup>a</sup>  | -                   | -                 | -                  |
| B <sub>1</sub>          | Madalin sicl   | 18.9 <sup>c</sup>       | 20.5 <sup>bc</sup> | 21.6 <sup>abc</sup> | 24.1 <sup>a</sup> | 22.8 <sup>ab</sup> |
| C <sub>1</sub>          | Rhinebeck sicl | 19.5 <sup>a</sup>       | 18.2 <sup>a</sup>  | 20.8 <sup>a</sup>   | 20.4 <sup>a</sup> | 18.9 <sup>a</sup>  |
| D <sub>1</sub>          | Covington sicl | 19.6 <sup>b</sup>       | 19.5 <sup>b</sup>  | 20.2 <sup>b</sup>   | 23.8 <sup>a</sup> | 19.5 <sup>b</sup>  |

Table 6. Mean Grain Yields, Bu/A (15% moisture), Field 3I.1, 1978

| Plot Area <sup>1/</sup> | Soil           | Treatment <sup>2/</sup> |                     |                     |                    |                    |
|-------------------------|----------------|-------------------------|---------------------|---------------------|--------------------|--------------------|
|                         |                | A                       | B                   | C                   | D                  | E                  |
| A <sub>1</sub>          | Swanton fsl    | 162.2 <sup>a3/</sup>    | 186.2 <sup>a</sup>  | -                   | -                  | -                  |
| B <sub>1</sub>          | Madalin sicl   | 142.3 <sup>b</sup>      | 155.6 <sup>ab</sup> | 158.2 <sup>ab</sup> | 168.2 <sup>a</sup> | 164.5 <sup>a</sup> |
| C <sub>1</sub>          | Rhinebeck sicl | 147.7 <sup>a</sup>      | 145.6 <sup>a</sup>  | 156.2 <sup>a</sup>  | 156.1 <sup>a</sup> | 142.3 <sup>a</sup> |
| D <sub>1</sub>          | Covington sicl | 146.3 <sup>ab</sup>     | 143.0 <sup>ab</sup> | 148.6 <sup>ab</sup> | 165.0 <sup>a</sup> | 134.6 <sup>b</sup> |

<sup>1/</sup> See plot location maps (Figures 4-7).

<sup>2/</sup> Treatments are distances (in feet) from the drain line: A = 0 feet, B = 25 feet, C = 50 feet, E = 0 feet.

<sup>3/</sup> Means superscripted by the same letter are not significantly different at P = 0.05 (Duncan's Multiple Range Test).

IV. Field 4-2<sup>1/</sup>

Tillage: chisel plowed once,

Pesticides: 2 lb/A Lasso + 1 lb/A Aatrex

Fertilizer: 12 T/A manure before tillage

32-0-0: 180 lb/A sidedress (32 % Nitran) 60 lbs/A of N

Planting: Corn, Pride R-121. Planted 5/16/78.

Harvest: Harvested by the same procedure as in Field 3I-1 except that the subplots were 2 rows x 25 feet long: 3 plots in the well drained portion, 3 plots in the poorly drained portion, and 3 plots over the large tile drain.

## Yields:

Table 7. Corn Silage, T/A (@ 70% moisture), Field 4-2, 1978.

| Plot No. and Portion of Field |           |                |                |
|-------------------------------|-----------|----------------|----------------|
| Well Drained                  |           | Poorly Drained | Over Tile Line |
| (1)                           | 24.6      | (4) 8.9        | (7) 33.2       |
| (2)                           | 36.2      | (5) 14.5       | (8) 36.8       |
| (3)                           | 27.9      | (6) 6.2        | (9) 39.8       |
| MEAN                          | 29.6      | 9.9            | 36.6           |
| S                             | $\pm 6.0$ | $\pm 4.2$      | $\pm 3.3$      |

Table 8. Corn Grain, Bu/A (@ 15% moisture) Field 4-2, 1978

| Plot No. and Portion of field |            |                |                |
|-------------------------------|------------|----------------|----------------|
| Well Drained                  |            | Poorly Drained | Over Tile Line |
| (1)                           | 183.0      | (4) 57.5       | (7) 241.4      |
| (2)                           | 268.3      | (5) 111.3      | (8) 276.6      |
| (3)                           | 232.4      | (6) 39.3       | (9) 230.2      |
| MEAN                          | 227.9      | 69.4           | 249.4          |
| S                             | $\pm 42.8$ | $\pm 37.4$     | $\pm 24.2$     |

<sup>1/</sup> Field 4-2 is not formally included in the Hatch 498 Project. The data are included to document the effects of drainage on crop yields.



## YIELD RESPONSES TO DRAINAGE

### Lake Alice:

The intention was to crop all the cropland areas in the same way. This was not possible in 1978, since the non-drained area at Lake Alice was too wet to make a timely planting of corn. Because of this prolonged wetness, it was judged unlikely that a successful corn crop could be grown. The relative values of corn and sudangrass as silage would make improved drainage seem profitable; but one season does not establish the profitability of drainage. This experiment should define how frequently a substitute crop is necessary and the relative costs and returns of such substitutions.

### Field 3I-2:

Block #1 apparently produced more corn silage than blocks 2 or 3. Any of the yield levels appear to be acceptable.

### Field 4-2:

The data clearly show the effects of drainage, and repeat a general pattern which has been documented since about 1973.

### Field 3I-1:

50-foot spacing: There were very few differences in yield as a function of distance from the drain. This essentially repeats the response observed with Sudangrass in 1977 (see Agronomy Mimeo 78-20).

100-foot spacing: Few yield response differences were noted; and some that were may well be the effect of soil disturbance during the installation of the drains.

## DISCUSSION

The general level of yields was very high, and probably marks 1978 as an exceptional year for corn yields. The rainfall was below the long term mean (LTM) as indicated in Figure 9. The combined rainfall for May and June approximated the LTM for those 2 months; 5.5 actual inches vs 5.6 inches (LTM). Rainfall in July, August and September was about 1 inch less than LTM for each of those months.

Since drainage is a method of removing excess soil water, one would expect reduced responses to drainage in a drier-than-normal season.

The mean yields of grain and silage in field 3I-1, over all soil types were:

50 foot spacing: Grain, 160.5 bu/A; Silage, 22.5 T/A

100 foot spacing: Grain, 157.3 bu/A; Silage, 21.9 T/A.

Clearly, there were no substantial differences attributable to tile spacings in 1978. It should be remembered, however, that this field had been too wet to cultivate prior to the drainage installation, and had not been cropped for about 30 years because of the wetness problem.

It is also interesting to note that, in field 3I-1, there were high yield levels in the poorly drained, fine textured Covington soils, which normally show limited responses to subsurface drainage. The mean yields for Covington soils were:

50 foot spacing: Grain, 152.9 bu/A; Silage, 21.8 T/A

100 foot spacing: Grain, 147.5 bu/A; Silage, 20.5 T/A.

While the drier-than-normal season prevents observations about the relative effectiveness of the tile spacings, the data illustrated the productivity of Covington soils when excess soil water does not limit plant growth.

It is quite possible to contrast the corn yields in field 3I-1 to the Sudangrass yields from the Lake Alice site. The Lake Alice site would have been planted to corn, if possible. It was not possible, because the soils were too wet during the normal corn planting season. A comparison of silage yields on similar soils at the 2 locations provides the following data:

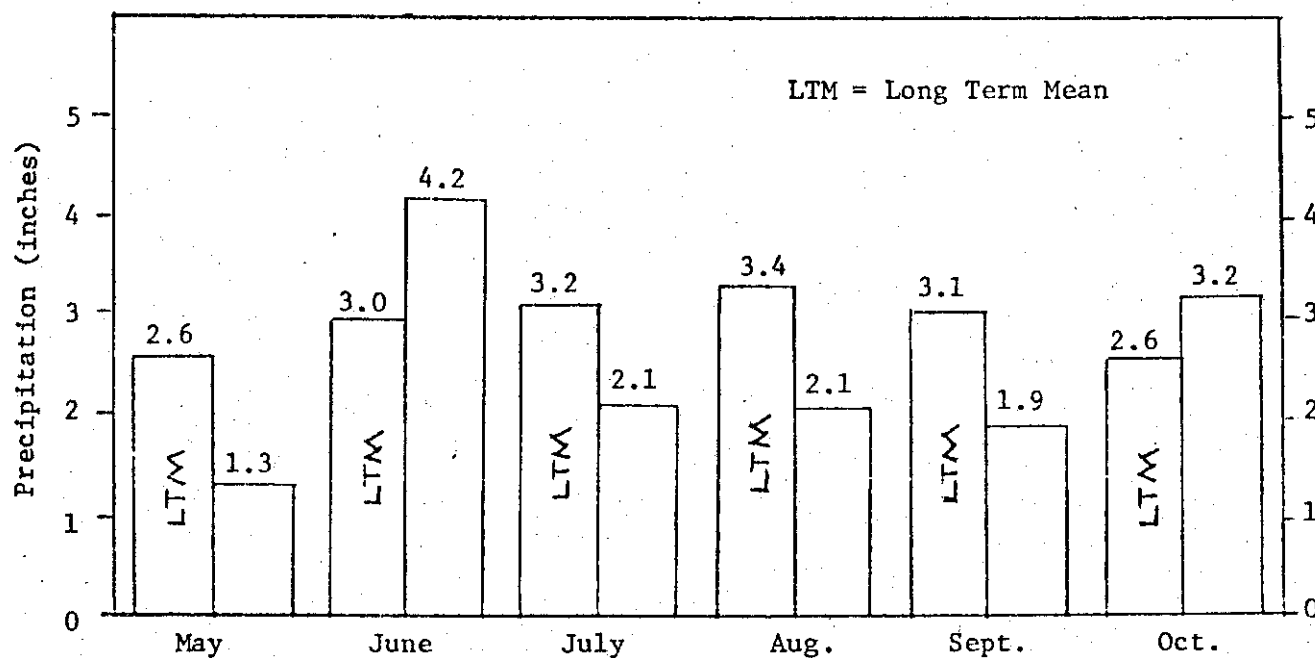


Fig. 9. Growing season rainfall, Chazy, N.Y., 1978.

Table 9. Silage yields on similar soils, Lake Alice and Field 3I-1

| Soil           | Silage Yield, tons/acre |                   |
|----------------|-------------------------|-------------------|
|                | Lake Alice (Sudangrass) | Field 3I-1 (corn) |
| Swanton fsl    | 3.9                     | 25.6              |
| Rhinebeck sicl | 3.6                     | 20.4              |
| Covington sicl | 2.5                     | 21.2              |

It should also be noted (Tables 7 & 8) that silage yields in field 4-2 were nearly 4 times as high where the soil had adequate artificial drainage than where it had not; and that corn grain yields were similarly higher where the naturally poorly drained soil had been drained.

## SOIL-WATER RESPONSES and TILE OUTFLOW

F.N. Swader and L.D. Geohring

METHODS

In addition to crop yield data, the influence of drainage on the levels of water in the soil were monitored, by installing perforated plastic pipes in the soil. The pipe locations are shown in figures 2, 10, 10a.

Twelve pipes were installed in field 3I-1, between tile lines #6 and #8, and six were installed between tile lines 2 and 3. The depth to the water surface was measured intensively from April 19 through June 30, and less frequently thereafter. The data are shown in Appendix B.

Six pipes were installed at the Lake Alice site (Figure 2), and similarly monitored. These provide a non-drained comparison for many of the soils which occur in field 3I-2. The data are shown in Appendix C.

Water table pipes were also installed in field 3I-2 at distances of 1, 30 and 45 feet upslope from a subsurface drain which is located at the boundary of 3I-2 and the adjacent pasture to the west, and in locations in field 3I-4 which are located where the subsurface drain would have been if it were extended to the north, and 30 feet on either side of such an extension. These data are shown in Appendix D and E, respectively.

Tile outflow measurements were begun in June 1978 and continued throughout the year on tile lines 3, 6, 9 and 12 in field 3I-1.

During June (when monthly precipitation was greater than the long term mean see Fig. 9) tile outflow measurements were made almost daily. As the soil moisture became depleted, and throughout the remainder of the season, flow measurements were conducted on a weekly basis until winter snow and freeze-up.

The tile outflows data are shown in Appendix F. The data were gathered by catching the outflow for a specific period of time, measuring it, and calculating the flow in gallons per minute (gpm). It should be noted that these are instantaneous values, and may not accurately represent tile flow for any entire day, or perhaps even a significant portion of a day.

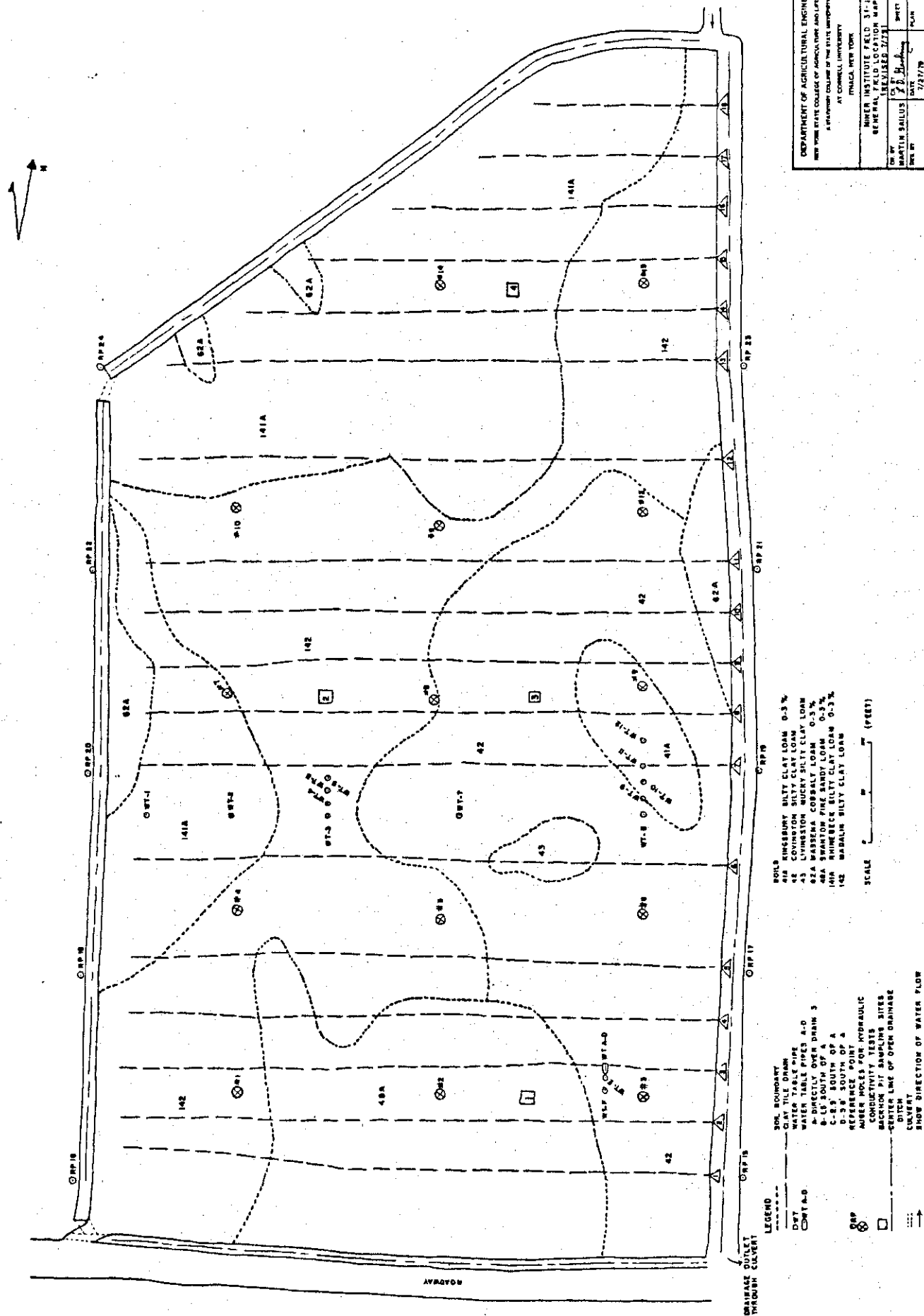


Figure 10.

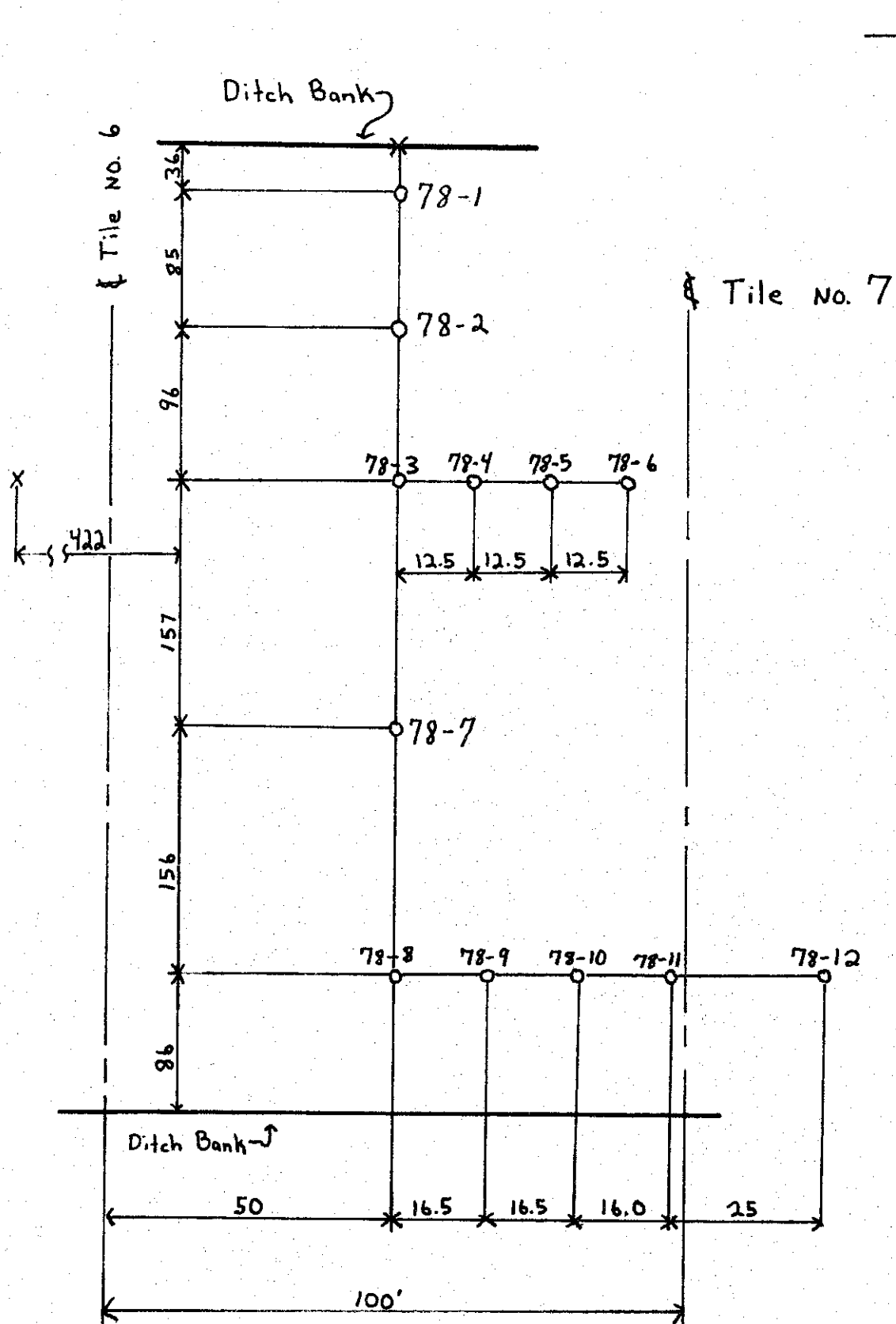


Figure 10a. Water Table Pipes  
 Miner Institute-Fld 3I-1  
 installed 6/27/77

## DISCUSSION

The daily rainfall and evaporation for the summer months are shown in table 10, and in graphic form in figure 9 (page 17). Rainfall was well below normal for the months of April and (especially) May.

Even with an unusually dry period, however, the effects of drainage on the depth to the water table are quite apparent. Figure 11 illustrates the effect of drainage on water table depths in Covington and Madalin soils. Covington soils are not as well drained (naturally) as are Madalin soils, although the non-drained areas (at Lake Alice) behave similar to one another. When the drained situations are compared, it is clear that - even at a distance of 50 feet from the drain, the water table in the Madalin soil is lower (deeper) than that in Covington soil.

The Covington soil did respond to subsurface drainage, however. Over the period from May 11 through June 15, the water table was about 18 inches lower in the drained Covington soil than in the non-drained Covington soil; and the rainfall of June 1 (1.1 inches) hardly influenced the water table in either of the drained soils, but caused a significant rise of the water table in the non-drained soils.

Another comparison of soil response to drainage is shown in figure 12, which shows the variations in depth to the water table in Covington soils at various distances from a subsurface drain over a period of 13 days. During the same time period, the water table in a non-drained Covington soil dropped by about 1 foot (LAWT-3, Appendix C).

Depending upon the degree of drainage improvement desired, and the willingness to invest in drainage, Covington soils can be drained. Subsurface drains at 100 foot spacings would require 436 feet of drain per acre of cost of \$220-\$350/acre.

The costs would double if drains were placed 50 feet apart. Some indication of the effectiveness of subsurface drains at 50 foot spacings is given in Figure 13, which compares water table levels at distances of 25

Table 10. Rainfall and Evaporation, Miner Institute, 1978

|        | April |      | May  |      | June |      | July |      | August |      |
|--------|-------|------|------|------|------|------|------|------|--------|------|
| Date   | Pptn  | Evap | Pptn | Evap | Pptn | Evap | Pptn | Evap | Pptn   | Evap |
| 1      | 0.40  | N/A  | -    | -    | 1.10 | 0.17 | -    | 0.22 | 0.10   | 0.29 |
| 2      | -     |      | -    | 0.17 | -    | 0.11 | -    | 0.19 | -      | 0.20 |
| 3      | -     |      | T    | 0.13 | 0.19 | 0.23 | -    | 0.10 | T      | 0.28 |
| 4      | -     |      | -    | 0.10 | -    | 0.06 | -    | 0.18 | 0.67   | 0.14 |
| 5      | 0.60  |      | -    | 0.08 | -    | 0.07 | -    | 0.18 | -      | 0.07 |
| 6      | -     |      | -    | 0.28 | 0.13 | 0.08 | -    | 0.31 | -      | 0.21 |
| 7      | -     |      | -    | 0.15 | -    | 0.22 | -    | 0.25 | -      | 0.13 |
| 8      | 0.13  |      | -    | 0.08 | 0.61 | 0.35 | -    | 0.27 | -      | 0.15 |
| 9      | -     |      | 0.11 | 0.23 | -    | 0.22 | 0.15 | 0.22 | 0.25   | 0.13 |
| 10     | -     |      | 0.06 | 0.11 | 0.10 | 0.09 | -    | 0.06 | 0.03   | 0.17 |
| 11     | 0.24  |      | 0.02 | 0.09 | -    | 0.15 | T    | 0.14 | -      | 0.16 |
| 12     | 0.12  |      | -    | 0.19 | -    | 0.12 | -    | 0.20 | T      | 0.22 |
| 13     | T     |      | -    | 0.11 | 0.06 | 0.26 | -    | 0.31 | 0.04   | 0.12 |
| 14     | -     |      | -    | 0.29 | 0.46 | 0.21 | 0.06 | 0.29 | -      | 0.30 |
| 15     | -     |      | 0.11 | 0.12 | T    | 0.12 | -    | 0.27 | -      | 0.34 |
| 16     | -     |      | 0.25 | 0.21 | -    | 0.27 | -    | 0.24 | -      | 0.36 |
| 17     | -     |      | 0.48 | 0.17 | -    | 0.29 | 0.47 | 0.10 | 0.14   | 0.29 |
| 18     | -     |      | 0.02 | 0.20 | 0.24 | 0.21 | -    | 0.28 | -      | 0.17 |
| 19     | -     |      | -    | 0.09 | 0.12 | 0.03 | -    | 0.18 | -      | 0.26 |
| 20     | 0.41  |      | -    | 0.11 | 0.75 | 0.20 | -    | 0.05 | -      | 0.19 |
| 21     | 0.12  |      | 0.27 | 0.18 | 0.26 | 0.10 | -    | 0.09 | T      | 0.20 |
| 22     | -     |      | T    | 0.12 | 0.09 | 0.16 | 0.46 | 0.30 | -      | 0.14 |
| 23     | -     |      | -    | 0.19 | -    | 0.08 | 0.13 | 0.16 | -      | 0.11 |
| 24     | -     |      | -    | 0.36 | 0.05 | 0.11 | 0.46 | 0.19 | 0.35   | 0.24 |
| 25     | -     |      | -    | 0.16 | -    | 0.31 | -    | 0.28 | 0.09   | 0.03 |
| 26     | -     |      | -    | 0.35 | -    | 0.21 | -    | 0.20 | -      | 0.18 |
| 27     | -     |      | -    | 0.21 | -    | 0.14 | -    | 0.28 | T      | 0.10 |
| 28     | -     |      | -    | 0.29 | 0.07 | 0.17 | 0.05 | 0.11 | T      | 0.01 |
| 29     | -     |      | -    | 0.21 | T    | 0.14 | -    | 0.25 | 0.42   | 0.01 |
| 30     | -     |      | -    | 0.28 | -    | 0.32 | 0.36 | 0.06 | -      | 0.11 |
| 31     | -     |      | -    | 0.23 | -    | -    | T    | 0.03 | -      | 0.25 |
| Totals | 2.02  |      | 1.32 |      | 4.23 |      | 2.14 |      | 2.09   |      |
| LTM*   | 2.50  |      | 2.59 |      | 3.00 |      | 3.16 |      | 3.35   |      |

\*Long Term Mean



Water table elevations - Miner Inst., 1978  
Madalin and Covington Soils

Figure 11.

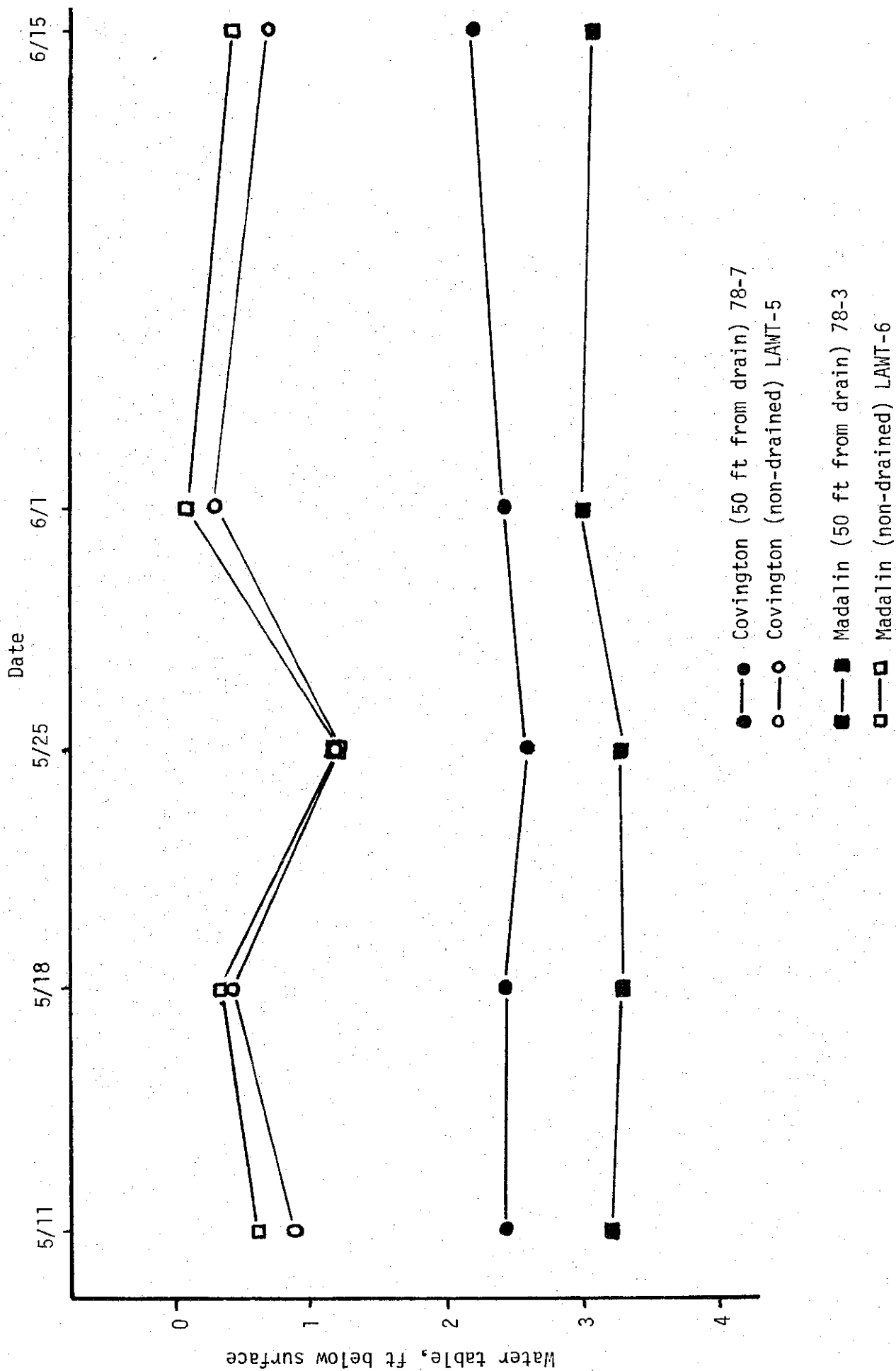


Figure 12. Water Table Depths - Miner Institute, 1978

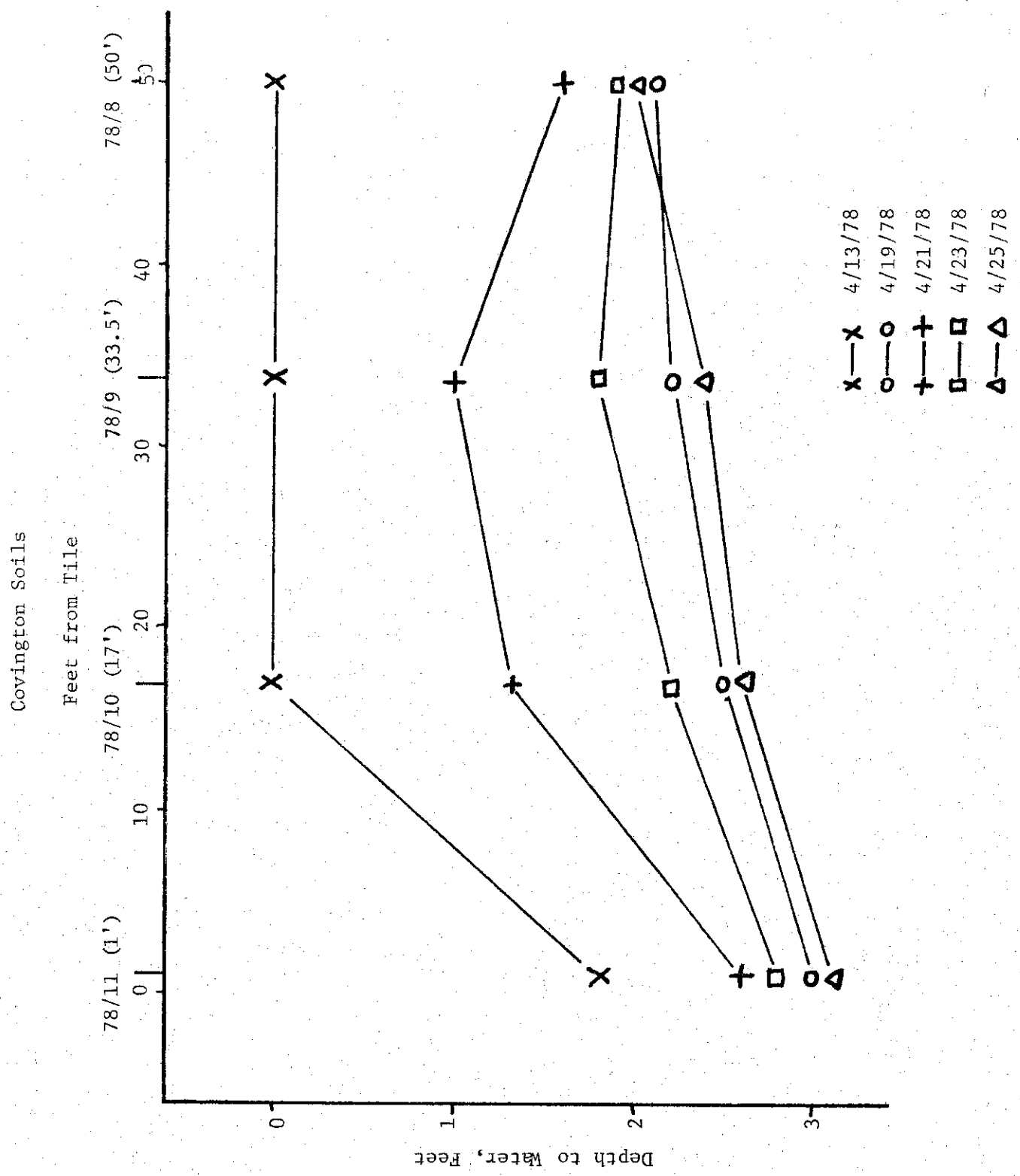
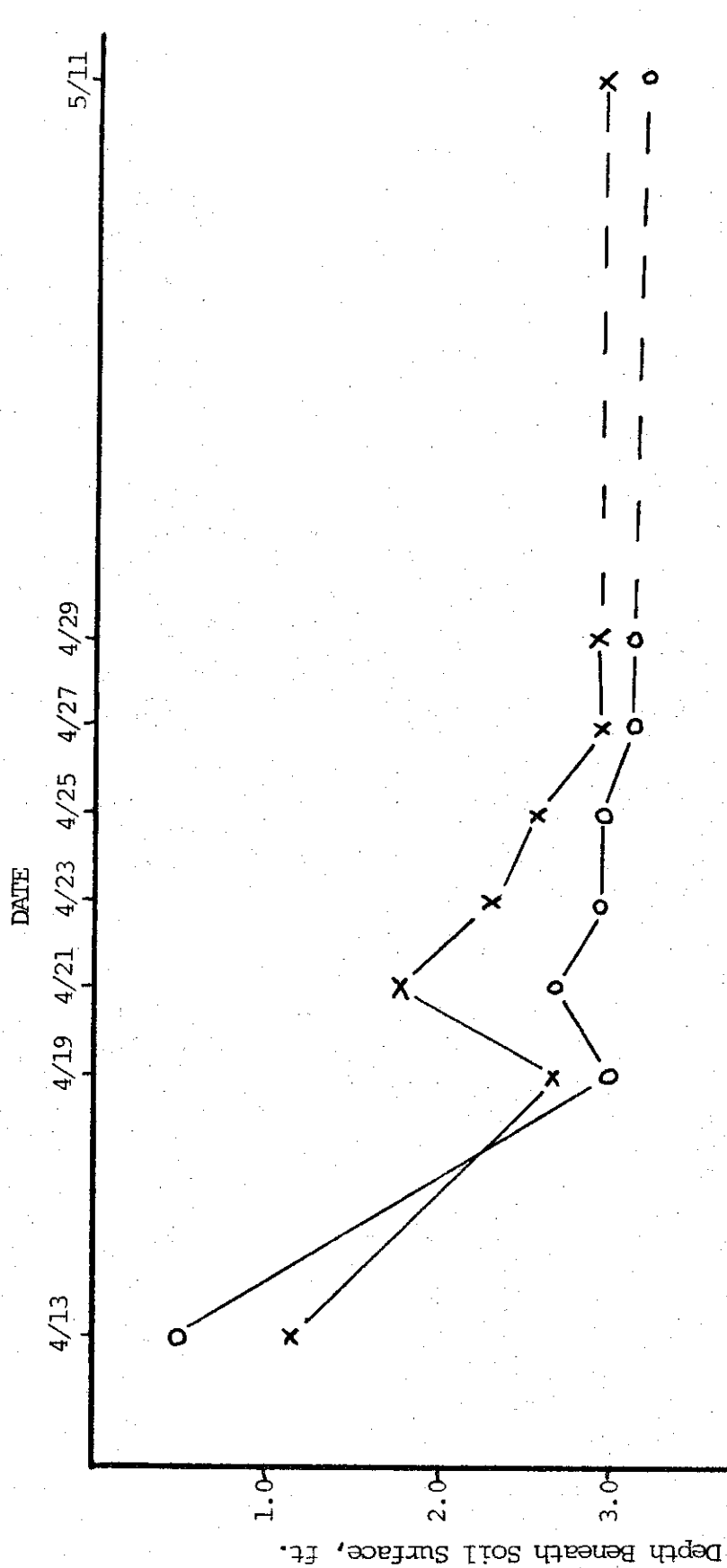


Figure 13. Water Table Elevations - Miner Institute, 1978  
Madalin and Covington Soils

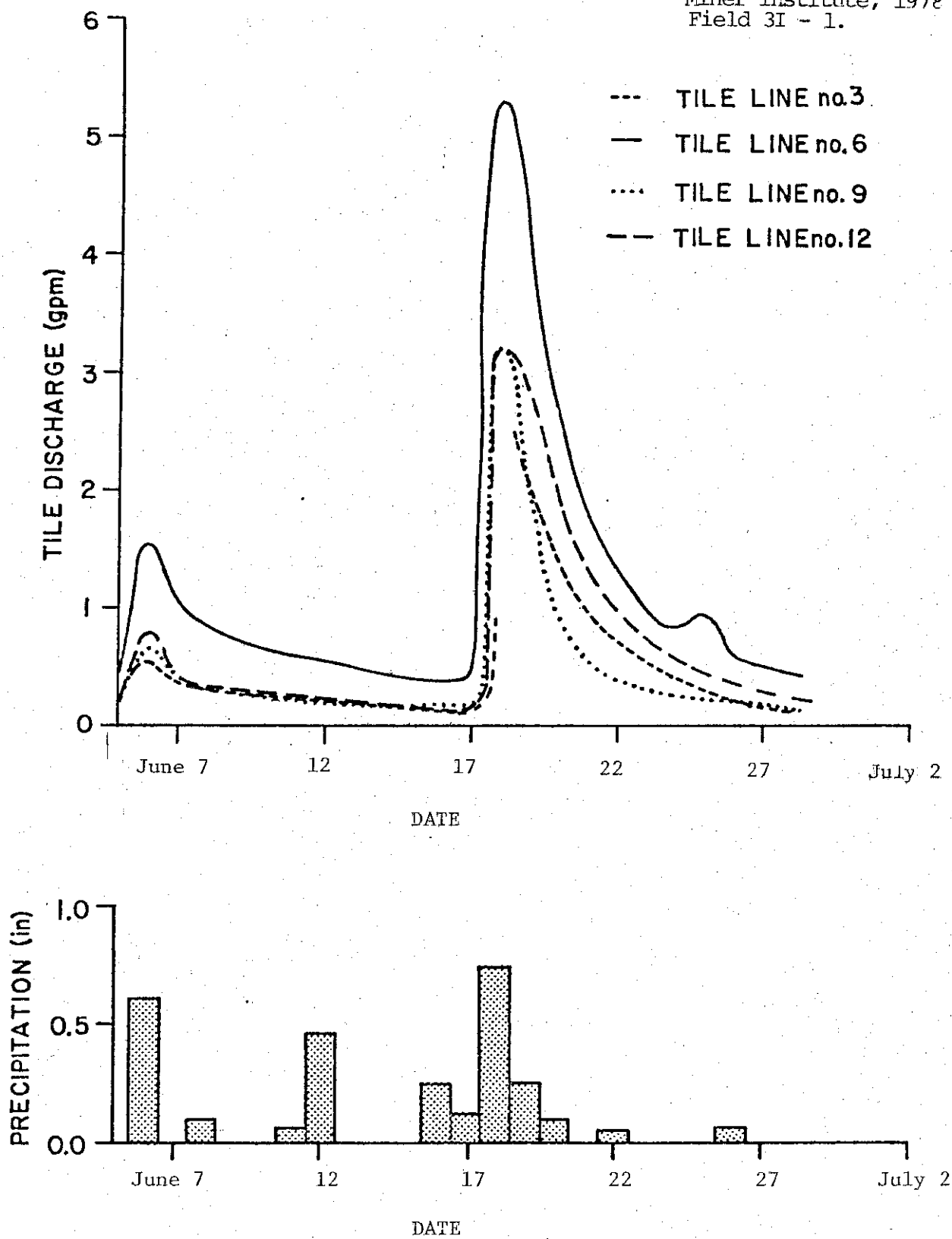


and 50 feet from a subsurface drain. These graphs indicate that, if drained at a 50-foot spacing, Covington soils will react much as Madalin soils drained at a 100 foot spacing.

Such data emphasize the importance of knowing the location and distribution of soils within a farm, to make knowledgeable choices about which soils to drain and how they are likely to respond.

Drain outflow data are shown in Figure 14. They seem to indicate that drain #6 has a more rapid and greater response to rainfall than the other drains that were tested. There is no apparent reason for such a response, based on the soils on their distribution over the various drains. Some leakage was observed at the outlet to drain #12. Continuous monitoring of the tile flows would provide valuable information about differences in drain discharge and the annual pattern of drain flow in these soils and climatic conditions.

Figure 14.  
Miner Institute, 1978  
Field 3I - 1.



APPENDIX A.  
CORN YIELDS -- MINER INSTITUTE 1978  
FIELD 3I-1

| PLOT           | TREATMENT<br>(Spacing, Feet) | GRAIN YIELD<br>(Bu/A @ 15%) | SILAGE YIELD<br>(T/A @ 70%) |
|----------------|------------------------------|-----------------------------|-----------------------------|
| A <sub>1</sub> | 1 0                          | 158.24                      | 22.58                       |
|                | 2 25                         | 154.10                      | 22.98                       |
|                | 3 0                          | 176.76                      | 26.24                       |
|                | 4 25                         | 179.12                      | 27.20                       |
|                | 5 0                          | 160.44                      | 23.22                       |
|                | 6 25                         | 206.82                      | 29.70                       |
|                | 7 0                          | 169.36                      | 25.32                       |
|                | 8 25                         | 204.90                      | 28.70                       |
| A <sub>2</sub> | 9 0                          | 174.24                      | 24.54                       |
|                | 10 25                        | 144.82                      | 22.06                       |
|                | 11 0                         | 162.22                      | 22.74                       |
|                | 12 0                         | 185.36                      | 25.10                       |
|                | 13 25                        | 199.24                      | 29.22                       |
|                | 14 0                         | 172.94                      | 25.14                       |
|                | 15 0                         | 179.24                      | 24.52                       |
|                | 16 25                        | 148.22                      | 22.00                       |
|                | 17 0                         | 183.06                      | 26.62                       |
|                | 18 0                         | 175.06                      | 31.88                       |
|                | 19 25                        | 180.00                      | 23.82                       |
|                | 20 0                         | 179.54                      | 25.62                       |
| D <sub>2</sub> | 21 0                         | 163.50                      | 22.32                       |
|                | 22 25                        | 178.74                      | 24.50                       |
|                | 23 0                         | 158.52                      | 23.00                       |
|                | 24 0                         | 138.52                      | 19.66                       |
|                | 25 25                        | 157.84                      | 20.34                       |
|                | 26 0                         | 177.80                      | 26.22                       |
|                | 27 0                         | 120.84                      | 18.08                       |
|                | 28 25                        | 149.92                      | 20.98                       |

| PLOT              | TREATMENT<br>(spacing, Feet) | GRAIN YIELD<br>(Bu/A @ 15%) | SILAGE YIELD<br>(T/A @ 70%) |
|-------------------|------------------------------|-----------------------------|-----------------------------|
| 29                | 0                            | 161.16                      | 25.02                       |
| 30                | 0                            | 115.62                      | 17.98                       |
| 31                | 25                           | 137.70                      | 19.04                       |
| 32                | 0                            | 174.94                      | 25.24                       |
| D <sub>1</sub> 33 | 0                            | 146.92                      | 19.66                       |
| 34                | 25                           | 140.36                      | 20.14                       |
| 35                | 50                           | 157.78                      | 21.44                       |
| 36                | 25                           | 174.12                      | 23.46                       |
| (21)              | 0                            | (163.50)                    | (22.32)                     |
| 37                | 0                            | 158.74                      | 20.72                       |
| 38                | 25                           | 144.86                      | 19.72                       |
| 39                | 50                           | 140.64                      | 18.84                       |
| 40                | 25                           | 163.44                      | 22.54                       |
| (24)              | 0                            | (138.52)                    | (19.66)                     |
| 41                | 0                            | 144.02                      | 19.48                       |
| 42                | 25                           | 157.64                      | 20.76                       |
| 43                | 50                           | 163.90                      | 22.08                       |
| 44                | 25                           | 154.76                      | 25.16                       |
| (27)              | 0                            | (120.84)                    | (18.08)                     |
| 45                | 0                            | 135.60                      | 18.56                       |
| 46                | 25                           | 129.26                      | 17.40                       |
| 47                | 50                           | 132.22                      | 18.56                       |
| 48                | 25                           | 167.94                      | 23.80                       |
| (30)              | 0                            | (115.62)                    | (17.98)                     |
| B <sub>2</sub> 49 | 0                            | 120.14                      | 16.86                       |
| 50                | 25                           | 180.94                      | 24.06                       |
| 51                | 0                            | 150.22                      | 21.84                       |
| 52                | 0                            | 149.16                      | 21.14                       |
| 53                | 25                           | 156.24                      | 22.28                       |
| 54                | 0                            | 166.28                      | 23.04                       |
| 55                | 0                            | 161.48                      | 22.28                       |
| 56                | 25                           | 163.20                      | 21.64                       |
| 57                | 0                            | 168.26                      | 23.10                       |
| 58                | 0                            | 137.38                      | 19.06                       |
| 59                | 25                           | 157.52                      | 22.98                       |
| 60                | 0                            | 174.58                      | 23.42                       |

| PLOT           |      | TREATMENT<br>(Spacing, Feet) | GRAIN YIELD<br>(Bu/A @ 15%) | SILAGE YIELD<br>(T/A @ 70%) |
|----------------|------|------------------------------|-----------------------------|-----------------------------|
| B <sub>1</sub> | 61   | 0                            | 142.32                      | 19.58                       |
|                | 62   | 25                           | 165.92                      | 20.44                       |
|                | 63   | 50                           | 149.72                      | 19.70                       |
|                | 64   | 25                           | 158.24                      | 22.26                       |
|                | 65   | 0                            | 169.50                      | 22.72                       |
|                | 66   | 0                            | 123.62                      | 16.76                       |
|                | 67   | 25                           | 159.86                      | 21.96                       |
|                | 68   | 50                           | 161.70                      | 22.40                       |
|                | 69   | 25                           | 160.02                      | 22.74                       |
|                | 70   | 0                            | 158.24                      | 22.18                       |
|                | 71   | 0                            | 151.72                      | 19.02                       |
|                | 72   | 25                           | 144.22                      | 19.20                       |
|                | 73   | 50                           | 171.92                      | 23.58                       |
|                | 74   | 25                           | 175.54                      | 27.18                       |
|                | 75   | 0                            | 172.68                      | 24.04                       |
|                | 76   | 0                            | 146.62                      | 20.34                       |
|                | 77   | 25                           | 152.62                      | 19.96                       |
|                | 78   | 50                           | 149.28                      | 20.84                       |
|                | 79   | 25                           | 179.34                      | 24.22                       |
|                | 80   | 0                            | 157.50                      | 22.40                       |
| C <sub>2</sub> | 97   | 0                            | 173.00                      | 22.64                       |
|                | 98   | 25                           | 185.90                      | 24.76                       |
|                | (81) | 0                            | (168.08)                    | (20.18)                     |
|                | 100  | 0                            | 156.18                      | 20.30                       |
|                | 101  | 25                           | 141.06                      | 19.22                       |
|                | (85) | 0                            | (173.94)                    | (22.04)                     |
|                | 103  | 0                            | 144.82                      | 20.66                       |
|                | 104  | 25                           | 170.86                      | 22.52                       |
|                | (89) | 0                            | (132.20)                    | (17.50)                     |
|                | 106  | 0                            | 168.76                      | 22.50                       |
|                | 107  | 25                           | 165.06                      | 22.24                       |
|                | (93) | 0                            | (116.64)                    | (18.32)                     |



| PLOT              | TREATMENT<br>(spacing, feet) | GRAIN YIELD<br>(Bu/A @ 15%) | SILAGE YIELD<br>(T/A @ 70%) |
|-------------------|------------------------------|-----------------------------|-----------------------------|
| C <sub>1</sub> 81 | 0                            | 168.80                      | 20.18                       |
| 82                | 25                           | 145.66                      | 17.24                       |
| 83                | 50                           | 175.12                      | 23.12                       |
| 84                | 25                           | 162.48                      | 20.98                       |
| (61)              | 0                            | (142.32)                    | (19.58)                     |
| 85                | 0                            | 173.94                      | 22.04                       |
| 86                | 25                           | 167.56                      | 19.90                       |
| 87                | 50                           | 157.06                      | 19.90                       |
| 88                | 25                           | 159.76                      | 20.10                       |
| (66)              | 0                            | (128.62)                    | (16.76)                     |
| 89                | 0                            | 132.20                      | 17.50                       |
| 90                | 25                           | 140.46                      | 19.00                       |
| 91                | 50                           | 149.50                      | 20.86                       |
| 92                | 25                           | 151.42                      | 20.24                       |
| (71)              | 0                            | (151.72)                    | (19.02)                     |
| 93                | 0                            | 116.64                      | 18.32                       |
| 94                | 25                           | 128.80                      | 16.52                       |
| 95                | 50                           | 143.12                      | 19.32                       |
| 96                | 25                           | 150.82                      | 20.30                       |
| (76)              | 0                            | (146.62)                    | (20.34)                     |

APPENDIX E.  
WATER TABLE ELEVATIONS - MINER INSTITUTE 1978  
FIELD 3I-1

| WATER TABLE PIPES |             |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |  |
|-------------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|--|
|                   |             | A                            |                           |                              | B                         |                              |                           | C                            |                           |                              | D                         |                              | E                         |  |
| Calendar Date     | Julian Date | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |  |
| 4/7               | 97          | 171.09                       | 2.59                      | 170.86                       | 2.78                      | 172.21                       | 1.54                      | Ice                          | -----                     | Ice                          | -----                     | Ice                          | -----                     |  |
| 4/9               | 99          | <170.30                      | >3.38                     | 170.56                       | 3.08                      | 171.86                       | 1.89                      | 172.58                       | 1.05                      | 173.20                       | 0.29                      | 173.20                       | 0.29                      |  |
| 4/10              | 100         | 170.94                       | 2.74                      | 171.05                       | 2.59                      | 171.71                       | 2.04                      | 173.34                       | 0.29                      | 173.19                       | 0.30                      | 173.19                       | 0.30                      |  |
| 4/11              | 101         | 171.47                       | 2.21                      | 171.58                       | 2.06                      | 171.86                       | 1.89                      | 173.63                       | 0.00                      | 173.28                       | 0.21                      | 173.28                       | 0.21                      |  |
| 4/13              | 103         | 171.09                       | 2.59                      | 170.71                       | 2.93                      | 172.66                       | 1.09                      | 173.15                       | 0.48                      | 172.82                       | 0.67                      | 172.82                       | 0.67                      |  |
| 4/19              | 109         | <170.30                      | >3.38                     | 171.31                       | 2.33                      | 171.26                       | 2.49                      | 171.65                       | 1.98                      | 170.63                       | 2.86                      | 170.63                       | 2.86                      |  |
| 4/20              | 110         | <170.30                      | >3.38                     | 170.66                       | 2.98                      | 171.25                       | 2.50                      | 171.98                       | 1.65                      | 170.92                       | 2.57                      | 170.92                       | 2.57                      |  |
| 4/21              | 111         | <170.30                      | >3.38                     | 170.56                       | 3.08                      | 171.17                       | 2.58                      | 172.08                       | 1.55                      | 170.93                       | 2.56                      | 170.93                       | 2.56                      |  |
| 4/22              | 112         | <170.30                      | >3.38                     | 170.56                       | 3.08                      | 171.16                       | 2.59                      | 172.02                       | 1.61                      | 170.88                       | 2.61                      | 170.88                       | 2.61                      |  |
| 4/23              | 113         | <170.30                      | >3.38                     | 170.56                       | 3.08                      | 171.11                       | 2.64                      | 171.94                       | 1.69                      | 170.88                       | 2.61                      | 170.88                       | 2.61                      |  |
| 4/24              | 114         | <170.30                      | >3.38                     | 170.56                       | 3.08                      | 171.08                       | 2.67                      | 171.84                       | 1.79                      | 170.83                       | 2.66                      | 170.83                       | 2.66                      |  |
| 4/25              | 115         | <170.30                      | >3.38                     | 170.56                       | 3.08                      | 171.03                       | 2.72                      | 171.82                       | 1.81                      | 170.83                       | 2.66                      | 170.83                       | 2.66                      |  |
| 4/26              | 116         | <170.30                      | >3.38                     | 170.56                       | 3.08                      | 170.96                       | 2.79                      | 171.81                       | 1.82                      | 170.83                       | 2.66                      | 170.83                       | 2.66                      |  |
| 4/27              | 117         | <170.30                      | >3.38                     | 170.51                       | 3.13                      | 170.96                       | 2.79                      | 171.74                       | 1.89                      | 170.83                       | 2.66                      | 170.83                       | 2.66                      |  |
| 4/29              | 119         | <170.30                      | >3.38                     | 170.51                       | 3.13                      | 170.93                       | 2.82                      | 171.68                       | 1.95                      | 170.82                       | 2.67                      | 170.82                       | 2.67                      |  |
| 5/11              | 131         | 171.07                       | 2.61                      | 170.71                       | 2.93                      | 171.36                       | 2.39                      | 170.78                       | 2.85                      | 170.47                       | 3.02                      | 170.47                       | 3.02                      |  |
| 5/18              | 138         | <170.30                      | >3.38                     | 170.49                       | 3.15                      | 170.62                       | 3.13                      | 170.18                       | 3.45                      | 170.52                       | 2.97                      | 170.52                       | 2.97                      |  |
| 5/25              | 145         | <170.30                      | >3.38                     | 170.52                       | 3.12                      | 170.52                       | 3.23                      | 171.00                       | 2.63                      | 170.46                       | 3.03                      | 170.46                       | 3.03                      |  |
| 6/1               | 152         | <170.30                      | >3.38                     | 170.46                       | 3.18                      | 170.66                       | 3.09                      | 171.03                       | 2.60                      | 170.88                       | 2.61                      | 170.88                       | 2.61                      |  |
| 6/6               | 157         | <170.30                      | >3.38                     | 170.55                       | 3.09                      | 170.61                       | 3.14                      | 171.07                       | 2.56                      | 170.78                       | 2.71                      | 170.78                       | 2.71                      |  |
| 6/7               | 158         | <170.30                      | >3.38                     | 170.52                       | 3.12                      | 170.63                       | 3.12                      | 171.07                       | 2.56                      | 170.78                       | 2.71                      | 170.78                       | 2.71                      |  |
| 6/8               | 159         | <170.30                      | >3.38                     | 170.52                       | 2.52                      | 170.61                       | 3.14                      | 170.29                       | 3.34                      | 170.83                       | 2.66                      | 170.83                       | 2.66                      |  |
| 6/9               | 160         | <170.30                      | >3.38                     | 170.45                       | 3.19                      | 170.58                       | 3.17                      | 170.90                       | 2.73                      | 171.73                       | 1.76                      | 171.73                       | 1.76                      |  |
| 6/12              | 163         | <170.30                      | >3.38                     | 170.48                       | 3.16                      | 170.55                       | 3.20                      | 171.18                       | 2.45                      | 170.81                       | 2.68                      | 170.81                       | 2.68                      |  |
| 6/13              | 164-1       | <170.30                      | >3.38                     | 170.47                       | 3.17                      | 170.55                       | 3.20                      | 171.18                       | 2.45                      | 170.78                       | 2.71                      | 170.78                       | 2.71                      |  |
| 6/13              | 164-2       | <170.30                      | >3.38                     | 170.45                       | 3.19                      | 170.53                       | 3.22                      | 171.14                       | 2.49                      | 170.75                       | 2.74                      | 170.75                       | 2.74                      |  |
| 6/13              | 164-3       | <170.30                      | >3.38                     | 170.47                       | 3.17                      | 170.53                       | 3.22                      | 171.14                       | 2.49                      | 170.76                       | 2.73                      | 170.76                       | 2.73                      |  |
| 6/14              | 165         | <170.30                      | >3.38                     | 170.52                       | 3.12                      | 170.58                       | 3.17                      | 171.14                       | 2.49                      | 170.71                       | 2.78                      | 170.71                       | 2.78                      |  |
| 6/15              | 166         | <170.30                      | >3.38                     | 170.43                       | 3.21                      | 170.55                       | 3.20                      | 171.14                       | 2.49                      | 170.65                       | 2.84                      | 170.65                       | 2.84                      |  |
| 6/16              | 167         | <170.30                      | >3.38                     | 170.45                       | 3.19                      | 170.53                       | 3.22                      | 171.11                       | 2.52                      | 170.62                       | 2.87                      | 170.62                       | 2.87                      |  |
| 6/19              | 170         | <170.30                      | >3.38                     | 170.45                       | 3.19                      | 170.55                       | 3.20                      | 171.19                       | 2.44                      | 170.62                       | 2.87                      | 170.62                       | 2.87                      |  |
| 6/21              | 172-1       | <170.30                      | >3.38                     | 170.45                       | 3.19                      | 170.58                       | 3.17                      | 172.46                       | 1.17                      | 171.40                       | 2.09                      | 171.40                       | 2.09                      |  |
| 6/21              | 172-2       | <170.30                      | >3.38                     | 170.61                       | 3.03                      | 170.70                       | 3.05                      | 172.47                       | 1.16                      | 171.73                       | 1.76                      | 171.73                       | 1.76                      |  |

APPENDIX B.  
WATER TABLE ELEVATIONS - MINER INSTITUTE 1978  
FIELD 31-1

| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | A                            |                           | B                            |                           | C                            |                           | D                            |                           | E                            |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 6/22          | 173         | <170.30                      | >3.38                     | 170.58                       | 3.06                      | 170.72                       | 3.03                      | 172.28                       | 1.35                      | 171.27                       | 2.22                      |
| 6/23          | 174         | <170.30                      | >3.38                     | 170.53                       | 3.11                      | 170.72                       | 3.03                      | 172.13                       | 1.50                      | 171.04                       | 2.45                      |
| 6/26          | 177         | <170.30                      | >3.38                     | 170.47                       | 3.17                      | 170.67                       | 3.08                      | 171.87                       | 1.76                      | 170.68                       | 2.81                      |
| 6/27          | 178         | <170.30                      | >3.38                     | 170.45                       | 3.19                      | 170.67                       | 3.08                      | 171.78                       | 1.85                      | 170.65                       | 2.84                      |
| 6/28          | 179         | <170.30                      | >3.38                     | 170.42                       | 3.22                      | 170.65                       | 3.10                      | 171.13                       | 2.50                      | 170.60                       | 2.89                      |
| 6/29          | 180         | <170.30                      | >3.38                     | 170.42                       | 3.22                      | 170.65                       | 3.10                      | 171.67                       | 2.50                      | 170.57                       | 2.92                      |
| 6/30          | 181         | <170.30                      | >3.38                     | 170.40                       | 3.24                      | 170.60                       | 3.15                      | 171.59                       | 2.04                      | 170.50                       | 2.99                      |
| 7/5           | 186         | <170.30                      | >3.38                     | 170.36                       | 3.28                      | 170.50                       | 3.25                      | 171.42                       | 2.21                      | 170.32                       | 3.17                      |
| 7/6           | 187         | <170.30                      | >3.38                     | 170.30                       | 3.34                      | 170.45                       | 3.30                      | 171.37                       | 2.26                      | 170.27                       | 3.22                      |
| 7/7           | 188         | <170.30                      | >3.38                     | 170.29                       | 3.35                      | 170.42                       | 3.33                      | 171.32                       | 2.31                      | 170.22                       | 3.27                      |
| 7/10          | 191         | <170.30                      | >3.38                     | 170.12                       | 3.52                      | 170.31                       | 3.44                      | 171.23                       | 2.40                      | 169.99                       | 3.50                      |
| 7/11          | 192         | <170.30                      | >3.38                     | 170.09                       | 3.55                      | 170.26                       | 3.49                      | 171.21                       | 2.42                      | 169.93                       | 3.56                      |
| 7/12          | 193         | <170.30                      | >3.38                     | 170.06                       | 3.58                      | 170.21                       | 3.54                      | 171.13                       | 2.50                      | 169.88                       | 3.61                      |
| 7/13          | 194         | <170.30                      | >3.38                     | 170.01                       | 3.63                      | 170.12                       | 3.63                      | 171.08                       | 2.55                      | 169.83                       | 3.66                      |
| 7/16          | 197         | <170.30                      | >3.38                     | 169.94                       | 3.70                      | 170.04                       | 3.71                      | 171.01                       | 2.62                      | 169.80                       | 3.69                      |
| 7/26          | 207         | <170.30                      | >3.38                     | 169.88                       | 3.76                      | 169.99                       | 3.76                      | 170.98                       | 2.65                      | 169.80                       | 3.69                      |
| 7/27          | 208         | <170.30                      | >3.38                     | 169.86                       | 3.78                      | 169.99                       | 3.76                      | 170.91                       | 2.72                      | 169.76                       | 3.73                      |
| 8/2           | 213         | <170.30                      | >3.38                     | 169.83                       | 3.81                      | 169.96                       | 3.79                      | 170.59                       | 3.04                      | 169.42                       | 4.07                      |
| 8/31          | 242         | <170.30                      | >3.38                     | 169.91                       | 3.73                      | 169.56                       | 4.19                      | 170.18                       | 3.45                      | 169.73                       | 3.76                      |
| 9/7           | 249         | <170.30                      | >3.38                     | 169.81                       | 3.83                      | <169.56                      | >4.19                     | 170.03                       | 3.60                      | <169.33                      | >4.16                     |
| 9/14          | 256         | <170.30                      | >3.38                     | -----                        | -----                     | <169.56                      | >4.19                     | -----                        | -----                     | -----                        | -----                     |
| 9/21          | 263         | <170.30                      | >3.38                     | 169.76                       | 3.88                      | <169.56                      | >4.19                     | 169.93                       | 3.70                      | <169.33                      | >4.16                     |
| 9/28          | 270         | <170.30                      | >3.38                     | 169.71                       | 3.93                      | <169.56                      | >4.19                     | 169.63                       | 4.00                      | <169.33                      | >4.16                     |
| 10/5          | 277         | <170.30                      | >3.38                     | 169.64                       | 4.00                      | <169.56                      | >4.19                     | 169.13                       | 4.50                      | <169.33                      | >4.16                     |
| 10/12         | 284         | <170.30                      | >3.38                     | 169.84                       | 3.80                      | 169.71                       | 4.04                      | 169.80                       | 3.83                      | 169.60                       | 3.89                      |
| 10/26         | 297         | 170.82                       | 2.86                      | 169.81                       | 3.83                      | 169.65                       | 4.10                      | 169.63                       | 4.00                      | 169.48                       | 4.01                      |
| 11/2          | 304         | 170.49                       | 3.19                      | 169.75                       | 3.89                      | <169.56                      | >4.19                     | 169.53                       | 4.10                      | 169.58                       | 3.91                      |
| 11/8          | 311         | 170.54                       | 3.14                      | 169.64                       | 4.00                      | <169.56                      | >4.19                     | 168.88                       | 4.75                      | 169.63                       | 3.86                      |
| 11/16         | 318         | 170.49                       | 3.19                      | <169.64                      | >4.00                     | <169.56                      | >4.19                     | 169.48                       | 4.15                      | 169.43                       | 4.06                      |
| 11/22         | 324         | 170.44                       | 3.24                      | <169.64                      | >4.00                     | <169.56                      | >4.19                     | 169.38                       | 4.25                      | 169.38                       | 4.11                      |
| 11/30         | 332         | 170.44                       | 3.24                      | <169.64                      | >4.00                     | <169.56                      | >4.19                     | 169.38                       | 4.25                      | 169.33                       | 4.16                      |
| 12/14         | 346         | <170.30                      | >3.38                     | 170.36                       | 3.28                      | 169.41                       | 4.34                      | 170.38                       | 3.25                      | 170.38                       | 3.11                      |
| 12/22         | 354         | <170.30                      | >3.38                     | 170.38                       | 3.26                      | 170.36                       | 3.39                      | 170.84                       | 3.29                      | 170.23                       | 3.26                      |

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|               |             | WATER TABLE PIPES            |                           |                              |                              |                           |                              |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|------------------------------|---------------------------|------------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | 78-1                         |                           |                              | 78-2                         |                           |                              | 78-3                         |                           |                              | 78-4                      |
| Calendar Date | Julian Date | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 4/7           | 97          | Ice                          | ----                      | 177.22                       | Ice                          | ----                      | Ice                          | Ice                          | ----                      | Ice                          | ----                      |
| 4/9           | 99          | ----                         | ----                      | 176.11                       | 175.45                       | 0.61                      | 174.36                       | 174.36                       | 0.76                      | 174.00                       | 0.95                      |
| 4/10          | 100         | 173.36                       | 0.12                      | 176.59                       | 175.85                       | 0.21                      | 175.67                       | 174.67                       | 0.45                      | 174.10                       | 0.85                      |
| 4/11          | 101         | 173.29                       | 0.19                      | 177.05                       | 176.06                       | 0.00                      | 175.12                       | 175.12                       | 0.00                      | 174.95                       | 0.00                      |
| 4/13          | 103         | 173.48                       | 0.00                      | 176.19                       | 175.68                       | 0.38                      | 174.66                       | 174.66                       | 0.46                      | 174.95                       | 0.00                      |
| 4/19          | 109         | 171.93                       | 1.55                      | 173.92                       | 173.48                       | 2.58                      | 172.16                       | 172.16                       | 2.96                      | 173.45                       | 1.50                      |
| 4/20          | 110         | 173.08                       | 0.40                      | 173.92                       | 173.37                       | 2.69                      | 172.12                       | 172.12                       | 3.00                      | 173.35                       | 1.60                      |
| 4/21          | 111         | ----                         | ----                      | 174.09                       | 173.36                       | 2.70                      | 172.45                       | 172.45                       | 2.67                      | 173.35                       | 1.60                      |
| 4/22          | 112         | 173.34                       | 0.14                      | 174.08                       | 173.35                       | 2.71                      | 172.43                       | 172.43                       | 2.69                      | 173.33                       | 1.62                      |
| 4/23          | 113         | 171.90                       | 1.58                      | 174.00                       | 173.34                       | 2.72                      | 172.32                       | 172.32                       | 2.80                      | 173.30                       | 1.65                      |
| 4/24          | 114         | 171.27                       | 2.21                      | 173.90                       | 173.27                       | 2.79                      | 172.24                       | 172.24                       | 2.88                      | 173.25                       | 1.70                      |
| 4/25          | 115         | 171.24                       | 2.24                      | 173.89                       | 173.16                       | 2.90                      | 172.21                       | 172.21                       | 2.91                      | 173.16                       | 1.79                      |
| 4/26          | 116         | 171.19                       | 2.29                      | 173.88                       | 173.14                       | 2.92                      | 172.03                       | 172.03                       | 3.09                      | 173.12                       | 1.83                      |
| 4/27          | 117         | 171.19                       | 2.29                      | 173.82                       | 173.06                       | 3.00                      | 172.02                       | 172.02                       | 3.10                      | 173.08                       | 1.87                      |
| 4/29          | 119         | 171.15                       | 2.33                      | 173.82                       | 172.98                       | 3.08                      | 171.98                       | 171.98                       | 3.14                      | 173.03                       | 1.92                      |
| 5/11          | 131         | <170.00                      | >3.48                     | 174.50                       | 172.30                       | 3.76                      | 171.89                       | 171.89                       | 3.23                      | 171.54                       | 3.41                      |
| 5/18          | 138         | 170.96                       | 2.52                      | 174.54                       | 172.00                       | 4.06                      | 171.84                       | 171.84                       | 3.28                      | 172.14                       | 2.81                      |
| 5/25          | 145         | 170.94                       | 2.54                      | 174.45                       | 172.14                       | 3.92                      | 171.85                       | 171.85                       | 3.27                      | 171.29                       | 3.68                      |
| 6/1           | 152         | 171.74                       | 1.74                      | 174.40                       | 171.71                       | 4.35                      | 172.09                       | 172.09                       | 3.03                      | 171.53                       | 3.42                      |
| 6/6           | 157         | 171.61                       | 1.87                      | 174.39                       | 172.28                       | 3.78                      | 172.04                       | 172.04                       | 3.08                      | 171.40                       | 3.55                      |
| 6/7           | 158         | 171.55                       | 1.93                      | 174.36                       | 172.63                       | 3.43                      | 171.96                       | 171.96                       | 3.16                      | 171.29                       | 3.66                      |
| 6/8           | 159         | 171.78                       | 1.70                      | 174.40                       | 172.73                       | 3.33                      | 172.24                       | 172.24                       | 2.88                      | 172.09                       | 2.86                      |
| 6/9           | 160         | 171.66                       | 1.82                      | 174.35                       | 172.68                       | 3.38                      | 172.29                       | 172.29                       | 2.83                      | 172.04                       | 2.91                      |
| 6/12          | 163         | 171.48                       | 2.00                      | 174.49                       | 172.72                       | 3.34                      | 172.11                       | 172.11                       | 3.01                      | 172.09                       | 2.86                      |
| 6/13          | 164-1       | 171.42                       | 2.06                      | 174.49                       | 172.70                       | 3.36                      | 172.06                       | 172.06                       | 3.06                      | 172.07                       | 2.88                      |
| 6/13          | 164-2       | 171.40                       | 2.08                      | 174.49                       | 172.68                       | 3.38                      | 172.05                       | 172.05                       | 3.07                      | 172.04                       | 2.91                      |
| 6/13          | 164-3       | 171.43                       | 2.05                      | 174.49                       | 172.67                       | 3.39                      | 172.03                       | 172.03                       | 3.09                      | 172.06                       | 2.89                      |
| 6/14          | 165         | 171.38                       | 2.10                      | 174.49                       | 172.73                       | 3.33                      | 172.05                       | 172.05                       | 3.07                      | 172.10                       | 2.85                      |
| 6/15          | 166         | 171.33                       | 2.15                      | 174.49                       | 172.72                       | 3.34                      | 172.05                       | 172.05                       | 3.07                      | 172.07                       | 2.88                      |
| 6/16          | 167         | 171.28                       | 2.20                      | 174.49                       | 172.73                       | 3.33                      | 172.02                       | 172.02                       | 3.10                      | 172.06                       | 2.89                      |
| 6/19          | 170         | 171.55                       | 1.93                      | 174.49                       | 172.70                       | 3.36                      | 171.97                       | 171.97                       | 3.15                      | 172.06                       | 2.89                      |
| 6/21          | 172-1       | 172.84                       | 0.64                      | 175.18                       | 173.03                       | 3.03                      | 173.85                       | 173.85                       | 1.27                      | 172.79                       | 2.16                      |
| 6/21          | 172-2       | 172.73                       | 0.75                      | 175.84                       | 174.93                       | 1.13                      | 174.08                       | 174.08                       | 1.04                      | 174.00                       | 0.94                      |

APPENDIX B.  
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| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | F                            |                           |                              |                           | 78-1                         |                           |                              |                           | 78-2                         |                           |                              |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 6/22          | 173         | 172.45                       | 1.03                      | 175.67                       | 2.23                      | 174.44                       | 1.62                      | 173.36                       | 1.76                      | 173.42                       | 1.53                      | 173.42                       | 1.53                      |
| 6/23          | 174         | 172.29                       | 1.19                      | 174.87                       | 3.03                      | 174.14                       | 1.92                      | 172.87                       | 2.25                      | 173.12                       | 1.83                      | 173.12                       | 1.83                      |
| 6/26          | 177         | 171.83                       | 1.65                      | 174.54                       | 3.36                      | 173.72                       | 2.34                      | 172.33                       | 2.79                      | 172.84                       | 2.11                      | 172.84                       | 2.11                      |
| 6/27          | 178         | 171.73                       | 1.75                      | 174.51                       | 3.39                      | 173.60                       | 2.46                      | 172.21                       | 2.91                      | 172.79                       | 2.16                      | 172.79                       | 2.16                      |
| 6/28          | 179         | 171.63                       | 1.85                      | 174.46                       | 3.44                      | 173.54                       | 2.52                      | 172.15                       | 2.97                      | 172.76                       | 2.19                      | 172.76                       | 2.19                      |
| 6/29          | 180         | 171.63                       | 1.85                      | 174.44                       | 3.46                      | 173.47                       | 2.59                      | 172.06                       | 3.06                      | 172.69                       | 2.26                      | 172.69                       | 2.26                      |
| 6/30          | 181         | 171.47                       | 2.01                      | 174.43                       | 3.47                      | 173.41                       | 2.65                      | 172.02                       | 3.10                      | 172.63                       | 2.32                      | 172.63                       | 2.32                      |
| 7/5           | 186         | 171.15                       | 2.33                      | 174.36                       | 3.54                      | 173.16                       | 2.90                      | 171.85                       | 3.27                      | 172.45                       | 2.50                      | 172.45                       | 2.50                      |
| 7/6           | 187         | 171.07                       | 2.41                      | <174.29                      | >3.61                     | 173.09                       | 2.97                      | 171.82                       | 3.30                      | 172.42                       | 2.53                      | 172.42                       | 2.53                      |
| 7/7           | 188         | 171.06                       | 2.42                      | <174.29                      | >3.61                     | 173.05                       | 3.01                      | 171.79                       | 3.33                      | 172.35                       | 2.60                      | 172.35                       | 2.60                      |
| 7/10          | 191         | 170.94                       | 2.54                      | <174.29                      | >3.61                     | 172.88                       | 3.18                      | 171.70                       | 3.42                      | 172.24                       | 2.71                      | 172.24                       | 2.71                      |
| 7/11          | 192         | 170.94                       | 2.54                      | <174.29                      | >3.61                     | 172.83                       | 3.23                      | 171.69                       | 3.43                      | 172.20                       | 2.75                      | 172.20                       | 2.75                      |
| 7/12          | 193         | 170.87                       | 2.61                      | <174.29                      | >3.61                     | 172.83                       | 3.23                      | 171.62                       | 3.50                      | 172.19                       | 2.76                      | 172.19                       | 2.76                      |
| 7/13          | 194         | 170.84                       | 2.64                      | <174.29                      | >3.61                     | 172.77                       | 3.29                      | 171.56                       | 3.56                      | 172.04                       | 2.91                      | 172.04                       | 2.91                      |
| 7/16          | 197         | 171.10                       | 2.38                      | <174.29                      | >3.61                     | 172.75                       | 3.31                      | 171.39                       | 3.73                      | 171.99                       | 2.96                      | 171.99                       | 2.96                      |
| 7/26          | 207         | 171.89                       | 1.59                      | <174.29                      | >3.61                     | 172.31                       | 3.75                      | 171.11                       | 4.01                      | 171.71                       | 3.24                      | 171.71                       | 3.24                      |
| 7/27          | 208         | 171.73                       | 1.75                      | <174.29                      | >3.61                     | 172.24                       | 3.82                      | 171.06                       | 4.06                      | 171.68                       | 3.27                      | 171.68                       | 3.27                      |
| 8/2           | 213         | 171.17                       | 2.13                      | <174.29                      | >3.61                     | 171.58                       | 4.47                      | 171.03                       | 4.09                      | 171.48                       | 3.47                      | 171.48                       | 3.47                      |
| 8/31          | 242         | 170.59                       | 2.89                      | <174.29                      | >3.61                     | 171.18                       | 4.38                      | 170.84                       | 4.28                      | 170.69                       | 4.26                      | 170.69                       | 4.26                      |
| 9/7           | 249         | 170.04                       | 3.44                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.49                      | >4.63                     | 170.29                       | 4.66                      | 170.29                       | 4.66                      |
| 9/14          | 256         | -----                        | -----                     | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.49                      | >4.63                     | -----                        | -----                     | -----                        | -----                     |
| 9/21          | 263         | 170.19                       | 3.29                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.49                      | >4.63                     | 170.44                       | 4.51                      | 170.44                       | 4.51                      |
| 9/28          | 270         | 170.44                       | 3.04                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.49                      | >4.63                     | 170.42                       | 4.53                      | 170.42                       | 4.53                      |
| 10/5          | 277         | 170.34                       | 3.14                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.49                      | >4.63                     | 170.59                       | 4.36                      | 170.59                       | 4.36                      |
| 10/12         | 284         | 171.87                       | 1.61                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | 170.89                       | 4.23                      | 170.74                       | 4.21                      | 170.74                       | 4.21                      |
| 10/26         | 297         | 170.99                       | 2.49                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | 170.77                       | 4.35                      | 170.74                       | 4.21                      | 170.74                       | 4.21                      |
| 11/2          | 304         | 170.69                       | 2.79                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.74                      | >4.38                     | 170.79                       | 4.16                      | 170.79                       | 4.16                      |
| 11/8          | 311         | 170.59                       | 2.89                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.74                      | >4.38                     | 170.74                       | 4.21                      | 170.74                       | 4.21                      |
| 11/16         | 318         | 170.49                       | 2.99                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.74                      | >4.38                     | 170.54                       | 4.41                      | 170.54                       | 4.41                      |
| 11/22         | 324         | 170.44                       | 3.04                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.74                      | >4.38                     | 170.54                       | 4.41                      | 170.54                       | 4.41                      |
| 11/30         | 332         | 170.39                       | 3.09                      | <174.29                      | >3.61                     | <171.18                      | >4.38                     | <170.74                      | >4.38                     | <170.51                      | >4.44                     | <170.51                      | >4.44                     |
| 12/14         | 346         | 171.39                       | 2.09                      | <174.29                      | >3.61                     | 172.03                       | 4.03                      | 172.04                       | 3.08                      | 170.44                       | 4.51                      | 170.44                       | 4.51                      |
| 12/22         | 354         | 171.03                       | 2.45                      | <174.29                      | >3.61                     | 171.88                       | 4.18                      | 171.79                       | 3.33                      | 170.64                       | 4.31                      | 170.64                       | 4.31                      |

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| WATER TABLE PIPES |             |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |  |
|-------------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|--|
|                   |             | 78-5                         |                           |                              | 78-6                      |                              |                           | 78-7                         |                           |                              | 78-8                      |                              |                           | 78-9                         |                           |  |
| Calendar Date     | Julian Date | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |  |
| 4/7               | 97          | 174.07                       | 0.88                      | 174.22                       | 0.74                      | 173.19                       | 0.74                      | Ice                          | ---                       | Ice                          | ---                       | Ice                          | ---                       | Ice                          | ---                       |  |
| 4/9               | 99          | 174.00                       | 0.95                      | 173.94                       | 1.02                      | 173.11                       | 0.82                      | Ice                          | ---                       | Ice                          | ---                       | Ice                          | ---                       | Ice                          | ---                       |  |
| 4/10              | 100         | 174.42                       | 0.53                      | 173.96                       | 1.00                      | 173.48                       | 0.45                      | 173.98                       | 0.00                      | 173.98                       | 0.00                      | 174.03                       | 0.00                      | 174.03                       | 0.00                      |  |
| 4/11              | 101         | 174.95                       | 0.00                      | 174.96                       | 0.00                      | 173.74                       | 0.19                      | 173.98                       | 0.00                      | 173.98                       | 0.00                      | 174.03                       | 0.00                      | 174.03                       | 0.00                      |  |
| 4/13              | 103         | 174.47                       | 0.48                      | 174.20                       | 0.76                      | 173.45                       | 0.48                      | 173.98                       | 0.00                      | 173.98                       | 0.00                      | 174.03                       | 0.00                      | 174.03                       | 0.00                      |  |
| 4/19              | 109         | 173.00                       | 1.95                      | 172.22                       | 2.74                      | 172.05                       | 1.88                      | 171.90                       | 2.08                      | 171.88                       | 2.15                      | 171.88                       | 2.15                      | 171.88                       | 2.15                      |  |
| 4/20              | 110         | 172.94                       | 2.01                      | 172.16                       | 2.80                      | 172.04                       | 1.89                      | 172.78                       | 1.20                      | 173.26                       | 0.77                      | 173.26                       | 0.77                      | 173.26                       | 0.77                      |  |
| 4/21              | 111         | 172.77                       | 2.18                      | 172.27                       | 2.69                      | 172.08                       | 1.85                      | 172.39                       | 1.59                      | 172.98                       | 1.05                      | 172.98                       | 1.05                      | 172.98                       | 1.05                      |  |
| 4/22              | 112         | 172.73                       | 2.22                      | 172.27                       | 2.69                      | 171.99                       | 1.94                      | 172.20                       | 1.78                      | 172.63                       | 1.40                      | 172.63                       | 1.40                      | 172.63                       | 1.40                      |  |
| 4/23              | 113         | 172.71                       | 2.24                      | 172.21                       | 2.75                      | 171.99                       | 1.94                      | 172.12                       | 1.86                      | 172.23                       | 1.80                      | 172.23                       | 1.80                      | 172.23                       | 1.80                      |  |
| 4/24              | 114         | 172.64                       | 2.31                      | 172.21                       | 2.75                      | 171.95                       | 1.98                      | 172.03                       | 1.95                      | 171.98                       | 2.05                      | 171.98                       | 2.05                      | 171.98                       | 2.05                      |  |
| 4/25              | 115         | 172.55                       | 2.40                      | 172.11                       | 2.85                      | 171.88                       | 2.05                      | 171.96                       | 2.02                      | 171.68                       | 2.35                      | 171.68                       | 2.35                      | 171.68                       | 2.35                      |  |
| 4/26              | 116         | 172.47                       | 2.48                      | 172.08                       | 2.88                      | 171.84                       | 2.09                      | 171.68                       | 2.30                      | 171.45                       | 2.58                      | 171.45                       | 2.58                      | 171.45                       | 2.58                      |  |
| 4/27              | 117         | 172.43                       | 2.52                      | 172.02                       | 2.94                      | 171.82                       | 2.11                      | 171.68                       | 2.30                      | 171.38                       | 2.65                      | 171.38                       | 2.65                      | 171.38                       | 2.65                      |  |
| 4/29              | 119         | 172.35                       | 2.60                      | 171.98                       | 2.98                      | 171.79                       | 2.14                      | 171.58                       | 2.40                      | 171.27                       | 2.76                      | 171.27                       | 2.76                      | 171.27                       | 2.76                      |  |
| 5/11              | 131         | 172.06                       | 2.89                      | 171.99                       | 2.97                      | 171.56                       | 2.37                      | 171.71                       | 2.27                      | 171.36                       | 2.67                      | 171.36                       | 2.67                      | 171.36                       | 2.67                      |  |
| 5/18              | 138         | 172.02                       | 2.93                      | 172.00                       | 2.96                      | 171.51                       | 2.42                      | 171.41                       | 2.57                      | 171.18                       | 2.85                      | 171.18                       | 2.85                      | 171.18                       | 2.85                      |  |
| 5/25              | 145         | 171.92                       | 3.03                      | 171.90                       | 3.06                      | 171.38                       | 2.55                      | 171.36                       | 2.62                      | 171.08                       | 2.95                      | 171.08                       | 2.95                      | 171.08                       | 2.95                      |  |
| 6/1               | 152         | 172.06                       | 2.89                      | 172.16                       | 2.80                      | 171.52                       | 2.41                      | 171.46                       | 2.52                      | 171.42                       | 2.61                      | 171.42                       | 2.61                      | 171.42                       | 2.61                      |  |
| 6/6               | 157         | 172.04                       | 2.91                      | 172.01                       | 2.95                      | 171.50                       | 2.43                      | 171.62                       | 2.36                      | 171.38                       | 2.65                      | 171.38                       | 2.65                      | 171.38                       | 2.65                      |  |
| 6/7               | 158         | 172.08                       | 2.87                      | 172.07                       | 2.89                      | 171.52                       | 2.41                      | 171.60                       | 2.38                      | 171.32                       | 2.71                      | 171.32                       | 2.71                      | 171.32                       | 2.71                      |  |
| 6/8               | 159         | 172.19                       | 2.76                      | 172.24                       | 2.72                      | 171.84                       | 2.09                      | 172.31                       | 1.67                      | 172.64                       | 1.39                      | 172.64                       | 1.39                      | 172.64                       | 1.39                      |  |
| 6/9               | 160         | 172.19                       | 2.76                      | 172.29                       | 2.67                      | 171.85                       | 2.08                      | 172.24                       | 1.74                      | 172.34                       | 1.69                      | 172.34                       | 1.69                      | 172.34                       | 1.69                      |  |
| 6/12              | 163         | 172.19                       | 2.76                      | 172.15                       | 2.80                      | 171.80                       | 2.13                      | 172.14                       | 1.84                      | 171.65                       | 2.38                      | 171.65                       | 2.38                      | 171.65                       | 2.38                      |  |
| 6/13              | 164-1       | 172.19                       | 2.76                      | 172.13                       | 2.83                      | 171.77                       | 2.16                      | 172.06                       | 1.92                      | 171.53                       | 2.50                      | 171.53                       | 2.50                      | 171.53                       | 2.50                      |  |
| 6/13              | 164-2       | 172.16                       | 2.79                      | 172.09                       | 2.87                      | 171.74                       | 2.19                      | 172.04                       | 1.94                      | 171.48                       | 2.55                      | 171.48                       | 2.55                      | 171.48                       | 2.55                      |  |
| 6/13              | 164-3       | 172.18                       | 2.77                      | 172.09                       | 2.87                      | 171.75                       | 2.18                      | 172.06                       | 1.92                      | 171.52                       | 2.51                      | 171.52                       | 2.51                      | 171.52                       | 2.51                      |  |
| 6/14              | 165         | 172.16                       | 2.79                      | 172.13                       | 2.83                      | 171.75                       | 2.18                      | 172.06                       | 1.92                      | 171.44                       | 2.59                      | 171.44                       | 2.59                      | 171.44                       | 2.59                      |  |
| 6/15              | 166         | 172.16                       | 2.79                      | 172.09                       | 2.87                      | 171.75                       | 2.18                      | 172.01                       | 1.97                      | 171.32                       | 2.71                      | 171.32                       | 2.71                      | 171.32                       | 2.71                      |  |
| 6/16              | 167         | 172.14                       | 2.81                      | 172.09                       | 2.87                      | 171.72                       | 2.21                      | 171.93                       | 2.05                      | 171.22                       | 2.81                      | 171.22                       | 2.81                      | 171.22                       | 2.81                      |  |
| 6/19              | 170         | 172.10                       | 2.85                      | 172.06                       | 2.90                      | 171.70                       | 2.22                      | 171.78                       | 2.20                      | 172.27                       | 2.76                      | 172.27                       | 2.76                      | 172.27                       | 2.76                      |  |
| 6/21              | 172-1       | 173.10                       | 1.85                      | 173.44                       | 1.52                      | 173.30                       | 0.63                      | 173.77                       | 0.21                      | 173.85                       | 0.18                      | 173.85                       | 0.18                      | 173.85                       | 0.18                      |  |
| 6/21              | 172-2       | 173.74                       | 1.21                      | 173.44                       | 1.52                      | 173.03                       | 0.89                      | 173.82                       | 0.16                      | 173.85                       | 0.18                      | 173.85                       | 0.18                      | 173.85                       | 0.18                      |  |

APPENDIX B.  
WATER TABLE ELEVATIONS - MINER INSTITUTE 1978  
FIELD 31-1

| WATER TABLE PIPES |             |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |                              |                           |  |
|-------------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|--|
| Calendar Date     | Julian Date | 78-5                         |                           |                              | 78-6                      |                              |                           | 78-7                         |                           |                              | 78-8                      |                              |                           | 78-9                         |                           |  |
|                   |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |  |
| 6/22              | 173         | 173.24                       | 1.71                      | 173.04                       | 1.92                      | 172.38                       | 1.55                      | 173.60                       | 0.36                      | 173.81                       | 0.22                      |                              |                           |                              |                           |  |
| 6/23              | 174         | 173.14                       | 1.81                      | 172.65                       | 2.31                      | 172.25                       | 1.68                      | 172.95                       | 1.03                      | 173.12                       | 0.91                      |                              |                           |                              |                           |  |
| 6/26              | 177         | 172.55                       | 2.40                      | 172.19                       | 2.77                      | 172.00                       | 1.93                      | 172.47                       | 1.51                      | 171.89                       | 2.14                      |                              |                           |                              |                           |  |
| 6/27              | 178         | 172.51                       | 2.44                      | 172.19                       | 2.77                      | 171.95                       | 1.98                      | 172.37                       | 1.61                      | 171.68                       | 2.35                      |                              |                           |                              |                           |  |
| 6/28              | 179         | 172.44                       | 2.51                      | 172.15                       | 2.80                      | 171.92                       | 2.01                      | 172.27                       | 1.71                      | 171.50                       | 2.53                      |                              |                           |                              |                           |  |
| 6/29              | 180         | 172.39                       | 2.56                      | 172.11                       | 2.85                      | 171.89                       | 2.04                      | 172.19                       | 1.79                      | 171.39                       | 2.64                      |                              |                           |                              |                           |  |
| 6/30              | 181         | 172.34                       | 2.61                      | 172.09                       | 2.87                      | 171.84                       | 2.09                      | 172.11                       | 1.87                      | 171.30                       | 2.73                      |                              |                           |                              |                           |  |
| 7/5               | 186         | 172.18                       | 2.77                      | 171.94                       | 3.02                      | 171.70                       | 2.22                      | 171.73                       | 2.25                      | 170.94                       | 3.09                      |                              |                           |                              |                           |  |
| 7/6               | 187         | 172.13                       | 2.82                      | 171.93                       | 3.03                      | 171.69                       | 2.23                      | 171.68                       | 2.30                      | 170.88                       | 3.15                      |                              |                           |                              |                           |  |
| 7/7               | 188         | 172.10                       | 2.85                      | 171.88                       | 3.08                      | 171.66                       | 2.27                      | 171.62                       | 2.36                      | 170.88                       | 3.15                      |                              |                           |                              |                           |  |
| 7/10              | 191         | 172.00                       | 2.95                      | 171.81                       | 3.15                      | 171.57                       | 2.36                      | 171.44                       | 2.54                      | 170.71                       | 3.32                      |                              |                           |                              |                           |  |
| 7/11              | 192         | 171.96                       | 2.99                      | 171.76                       | 3.20                      | 171.53                       | 2.40                      | 171.24                       | 2.74                      | 170.66                       | 3.36                      |                              |                           |                              |                           |  |
| 7/12              | 193         | 171.90                       | 3.05                      | 171.68                       | 3.28                      | 171.41                       | 2.52                      | 171.09                       | 2.89                      | 170.60                       | 3.43                      |                              |                           |                              |                           |  |
| 7/13              | 194         | 171.83                       | 3.12                      | 171.61                       | 3.34                      | 171.36                       | 2.57                      | 170.90                       | 3.08                      | 170.50                       | 3.53                      |                              |                           |                              |                           |  |
| 7/16              | 197         | 171.75                       | 3.20                      | 171.42                       | 3.54                      | 171.23                       | 2.70                      | 170.50                       | 3.48                      | 170.22                       | 3.81                      |                              |                           |                              |                           |  |
| 7/26              | 207         | 171.60                       | 3.35                      | 171.17                       | 3.79                      | 171.15                       | 2.78                      | 171.06                       | 2.92                      | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 7/27              | 208         | 171.50                       | 3.45                      | 171.12                       | 3.84                      | 171.10                       | 2.83                      | 170.83                       | 3.15                      | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 8/2               | 213         | 171.21                       | 3.74                      | 170.97                       | 3.98                      | 170.82                       | 3.11                      | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 8/31              | 242         | 170.94                       | 4.01                      | 170.77                       | 4.19                      | 169.76                       | 4.17                      | 170.46                       | 3.52                      | 170.03                       | 4.00                      |                              |                           |                              |                           |  |
| 9/7               | 249         | 170.69                       | 4.26                      | 170.62                       | 4.34                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 9/14              | 256         | -----                        | -----                     | -----                        | -----                     | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 9/21              | 263         | 170.64                       | 4.31                      | 170.67                       | 4.29                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 9/28              | 270         | 170.74                       | 4.21                      | 170.72                       | 4.24                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 10/5              | 277         | 170.64                       | 4.31                      | <170.62                      | >4.34                     | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 10/12             | 284         | 170.70                       | 4.25                      | 170.83                       | 4.13                      | <169.66                      | >4.27                     | 170.76                       | 3.22                      | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 10/26             | 297         | <170.64                      | >4.31                     | 170.72                       | 4.24                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 11/2              | 304         | <170.64                      | >4.31                     | 170.72                       | 4.24                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 11/8              | 311         | <170.64                      | >4.31                     | 170.72                       | 4.24                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 11/16             | 318         | <170.64                      | >4.31                     | 170.67                       | 4.29                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 11/22             | 324         | <170.64                      | >4.31                     | 170.62                       | 4.34                      | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 11/30             | 332         | <170.64                      | >4.31                     | <170.62                      | >4.34                     | <169.66                      | >4.27                     | <170.37                      | >3.61                     | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 12/14             | 346         | 172.09                       | 2.86                      | 172.07                       | 2.89                      | 171.41                       | 2.52                      | 170.96                       | 3.02                      | <170.02                      | >4.01                     |                              |                           |                              |                           |  |
| 12/22             | 354         | 171.94                       | 3.01                      | 172.67                       | 2.29                      | 171.31                       | 2.62                      | 170.92                       | 3.06                      | 170.72                       | 3.31                      |                              |                           |                              |                           |  |

## APPENDIX B.

WATER TABLE ELEVATIONS - MINER INSTITUTE 1978  
FIELD 31-1

| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | 78-10                        |                           | 78-11                        |                           | 78-12                        |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 4/7           | 97          | Ice                          | -----                     | 173.57                       | 0.80                      | Ice                          | -----                     |
| 4/9           | 99          | 173.48                       | 0.51                      | 172.56                       | 1.81                      | Ice                          | -----                     |
| 4/10          | 100         | 173.99                       | 0.00                      | 172.98                       | 1.39                      | 173.70                       | 0.85                      |
| 4/11          | 101         | 173.99                       | 0.00                      | 173.37                       | 1.00                      | 173.79                       | 0.76                      |
| 4/13          | 103         | 173.99                       | 0.00                      | 172.55                       | 1.82                      | 173.40                       | 1.15                      |
| 4/19          | 109         | 171.51                       | 2.48                      | 171.37                       | 3.00                      | 171.75                       | 2.80                      |
| 4/20          | 110         | 173.08                       | 0.91                      | 171.56                       | 2.81                      | 172.86                       | 1.69                      |
| 4/21          | 111         | 172.66                       | 1.33                      | 171.78                       | 2.59                      | 172.75                       | 1.80                      |
| 4/22          | 112         | 172.22                       | 1.77                      | 171.72                       | 2.65                      | 172.50                       | 2.05                      |
| 4/23          | 113         | 171.84                       | 2.15                      | 171.57                       | 2.80                      | 172.22                       | 2.33                      |
| 4/24          | 114         | 171.61                       | 2.38                      | 171.42                       | 2.95                      | 172.05                       | 2.50                      |
| 4/25          | 115         | 171.39                       | 2.60                      | 171.31                       | 3.06                      | 171.95                       | 2.60                      |
| 4/26          | 116         | 171.24                       | 2.75                      | 171.18                       | 3.19                      | 171.76                       | 2.79                      |
| 4/27          | 117         | 171.18                       | 2.81                      | 171.14                       | 3.23                      | 171.69                       | 2.86                      |
| 4/29          | 119         | 171.10                       | 2.89                      | 171.07                       | 3.30                      | 171.61                       | 2.94                      |
| 5/11          | 131         | 171.34                       | 2.65                      | 171.54                       | 2.83                      | 171.74                       | 2.81                      |
| 5/18          | 138         | 171.38                       | 2.61                      | 171.46                       | 2.91                      | 171.64                       | 2.91                      |
| 5/25          | 145         | 171.28                       | 2.71                      | 171.49                       | 2.88                      | 171.53                       | 3.02                      |
| 6/1           | 152         | 171.69                       | 2.30                      | 171.55                       | 2.82                      | 171.59                       | 2.96                      |
| 6/6           | 157         | 171.44                       | 2.55                      | 171.59                       | 2.78                      | 171.61                       | 2.94                      |
| 6/7           | 158         | 171.40                       | 2.59                      | 171.58                       | 2.79                      | 171.60                       | 2.95                      |
| 6/8           | 159         | 172.48                       | 1.51                      | 171.73                       | 2.64                      | 171.80                       | 2.75                      |
| 6/9           | 160         | 172.22                       | 1.77                      | 171.83                       | 2.54                      | 171.84                       | 2.71                      |
| 6/12          | 163         | 171.63                       | 2.36                      | 171.67                       | 2.70                      | 171.79                       | 2.76                      |
| 6/13          | 164-1       | 171.54                       | 2.44                      | 171.65                       | 2.72                      | 171.76                       | 2.79                      |
| 6/13          | 164-2       | 171.50                       | 2.49                      | 171.60                       | 2.77                      | 171.70                       | 2.84                      |
| 6/13          | 164-3       | 171.60                       | 2.39                      | 171.60                       | 2.77                      | 171.70                       | 2.84                      |
| 6/14          | 165         | 171.53                       | 2.46                      | 171.60                       | 2.77                      | 171.72                       | 2.83                      |
| 6/15          | 166         | 171.46                       | 2.53                      | 171.59                       | 2.78                      | 171.69                       | 2.86                      |
| 6/16          | 167         | 171.36                       | 2.62                      | 171.56                       | 2.81                      | 171.64                       | 2.90                      |
| 6/19          | 170         | 171.46                       | 2.53                      | 171.49                       | 2.88                      | 171.51                       | 3.04                      |
| 6/21          | 172-1       | 173.89                       | 0.10                      | 172.26                       | 2.11                      | 173.81                       | 0.74                      |
| 6/21          | 172-2       | 173.86                       | 0.13                      | 172.97                       | 1.40                      | 173.79                       | 0.76                      |



## APPENDIX C.

WATER TABLE ELEVATIONS - MINER INSTITUTE 1978  
FIELD 3I-1

| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | 78-10                        |                           | 78-11                        |                           | 78-12                        |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 6/22          | 173         | 173.60                       | 0.39                      | 172.62                       | 1.75                      | 173.33                       | 1.22                      |
| 6/23          | 174         | 172.92                       | 1.07                      | 172.39                       | 1.97                      | 172.90                       | 1.65                      |
| 6/26          | 177         | 171.86                       | 2.13                      | 171.91                       | 2.45                      | 172.28                       | 2.27                      |
| 6/27          | 178         | 171.73                       | 2.26                      | 171.82                       | 2.55                      | 172.17                       | 2.38                      |
| 6/28          | 179         | 171.60                       | 2.39                      | 171.74                       | 2.63                      | 172.05                       | 2.50                      |
| 6/29          | 180         | 171.48                       | 2.51                      | 171.64                       | 2.73                      | 171.92                       | 2.63                      |
| 6/30          | 181         | 171.41                       | 2.57                      | 171.57                       | 2.80                      | 171.84                       | 2.71                      |
| 7/5           | 186         | 171.09                       | 2.90                      | 171.34                       | 3.03                      | 171.43                       | 3.12                      |
| 7/6           | 187         | 171.02                       | 2.97                      | 171.28                       | 3.09                      | 171.38                       | 3.17                      |
| 7/7           | 188         | 170.97                       | 3.01                      | 171.19                       | 3.18                      | 171.33                       | 3.22                      |
| 7/10          | 191         | 170.77                       | 3.21                      | 171.00                       | 3.37                      | 171.08                       | 3.46                      |
| 7/11          | 192         | 170.69                       | 3.99                      | 170.98                       | 3.39                      | 171.00                       | 3.55                      |
| 7/12          | 193         | 170.59                       | 3.40                      | 170.96                       | 3.41                      | 170.93                       | 3.61                      |
| 7/13          | 194         | 170.52                       | 3.46                      | 170.95                       | 3.42                      | <170.80                      | >3.74                     |
| 7/16          | 197         | 170.28                       | 3.71                      | 170.93                       | 3.44                      | <170.80                      | >3.74                     |
| 7/26          | 207         | <170.22                      | >3.77                     | 170.95                       | 3.42                      | <170.80                      | >3.74                     |
| 7/27          | 208         | <170.22                      | >3.77                     | 170.93                       | 3.44                      | <170.80                      | >3.74                     |
| 8/2           | 213         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.80                      | >3.74                     |
| 8/31          | 242         | 170.19                       | 3.80                      | 170.74                       | 3.63                      | 170.71                       | 3.84                      |
| 9/7           | 249         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 9/14          | 256         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 9/21          | 263         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 9/28          | 270         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 10/5          | 277         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 10/12         | 284         | <170.22                      | >3.77                     | 170.64                       | 3.73                      | 171.20                       | 3.35                      |
| 10/26         | 297         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | 170.93                       | 3.62                      |
| 11/2          | 304         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 11/8          | 311         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 11/16         | 318         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 11/22         | 324         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 11/30         | 332         | <170.22                      | >3.77                     | <170.64                      | >3.73                     | <170.71                      | >3.84                     |
| 12/14         | 346         | 171.04                       | 2.95                      | 171.29                       | 3.08                      | 171.04                       | 3.51                      |
| 12/22         | 354         | 170.84                       | 3.15                      | 171.07                       | 3.30                      | 170.93                       | 3.62                      |

## APPENDIX C.

## WATER TABLE ELEVATIONS - MINER INSTITUTE - 1978

## FIELD - LAKE ALICE

| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | LAWT-1                       |                           | LAWT-2                       |                           | LAWT-3                       |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 4/7           | 97          | 361.10                       | 0.00                      | >361.72                      | <0.00                     | >361.93                      | <0.00                     |
| 4/13          | 103         | >361.10                      | <0.00                     | >361.72                      | <0.00                     | 361.54                       | 0.39                      |
| 4/20          | 110         | 360.98                       | 0.12                      | >361.72                      | <0.00                     | 361.54                       | 0.39                      |
| 4/27          | 117         | 360.18                       | 0.92                      | 360.78                       | 0.94                      | 360.90                       | 1.03                      |
| 5/4           | 124         | 359.47                       | 1.63                      | 360.26                       | 1.46                      | 360.44                       | 1.49                      |
| 5/11          | 131         | 359.46                       | 1.64                      | 360.28                       | 1.44                      | 360.53                       | 1.40                      |
| 5/18          | 138         | 360.10                       | 1.00                      | 360.91                       | 0.81                      | 361.00                       | 0.93                      |
| 5/25          | 145         | 358.80                       | 2.30                      | 359.69                       | 2.03                      | 359.94                       | 1.99                      |
| 6/1           | 152         | 360.51                       | 0.59                      | 361.45                       | 0.27                      | 361.38                       | 0.55                      |
| 6/6           | 157         | 359.67                       | 1.43                      | 360.47                       | 1.25                      | 360.79                       | 1.14                      |
| 6/7           | 158         | 359.42                       | 1.68                      | 360.24                       | 1.48                      | 360.58                       | 1.35                      |
| 6/8           | 159         | 360.65                       | 0.45                      | 361.38                       | 0.34                      | 361.44                       | 0.49                      |
| 6/9           | 160         | 360.09                       | 1.01                      | 360.92                       | 0.80                      | 361.04                       | 0.89                      |
| 6/12          | 163         | 359.17                       | 1.93                      | 360.06                       | 1.66                      | 360.38                       | 1.55                      |
| 6/13          | 164         | 358.97                       | 2.13                      | 359.96                       | 1.76                      | 360.32                       | 1.61                      |
| 6/13          | 164         | 359.66                       | 1.44                      | 360.88                       | 0.84                      | 361.30                       | 0.63                      |
| 6/14          | 165         | 360.10                       | 1.05                      | 360.95                       | 0.77                      | 361.17                       | 0.76                      |
| 6/15          | 166         | 359.56                       | 1.54                      | 360.44                       | 1.28                      | 360.68                       | 1.25                      |
| 6/16          | 167         | 359.20                       | 1.90                      | 360.08                       | 1.64                      | 360.35                       | 1.58                      |
| 6/19          | 170         | 359.27                       | 1.83                      | 360.21                       | 1.51                      | 360.51                       | 1.42                      |
| 6/20          | 171         | 361.01                       | 0.09                      | 361.72                       | 0.00                      | 361.76                       | 0.17                      |
| 6/20          | 171         | 361.01                       | 0.09                      | 361.72                       | 0.00                      | 361.69                       | 0.24                      |
| 6/21          | 172         | 360.89                       | 0.21                      | 361.72                       | 0.00                      | 361.40                       | 0.53                      |
| 6/22          | 173         | 360.81                       | 0.29                      | 361.47                       | 0.25                      | 361.36                       | 0.56                      |
| 6/23          | 174         | 360.22                       | 0.88                      | 360.98                       | 0.74                      | 360.97                       | 0.96                      |
| 6/26          | 177         | 359.23                       | 1.87                      | 360.13                       | 1.59                      | 360.35                       | 1.58                      |
| 6/27          | 178         | 359.10                       | 2.00                      | 359.96                       | 1.76                      | 360.22                       | 1.71                      |
| 6/28          | 179         | 359.02                       | 2.08                      | 359.93                       | 1.79                      | 360.15                       | 1.78                      |

Note: the greater than (>) and lesser than (<) symbols indicate the upper and lower boundaries of the water table measurement pipe.

## APPENDIX

## WATER TABLE ELEVATIONS - MINER INSTITUTE - 1978

## FIELD - LAKE ALICE

| Calendar Date | Julian Date | WATER TABLE PIPES             |                           |                              |                           |                              |                           |
|---------------|-------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | LAWT-1                        |                           | LAWT-2                       |                           | LAWT-3                       |                           |
|               |             | Water Table Elevation (feet), | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 6/29          | 180         | 358.82                        | 2.28                      | 359.67                       | 2.05                      | 359.91                       | 2.02                      |
| 6/30          | 181         | 358.68                        | 2.42                      | 359.49                       | 2.23                      | 359.69                       | 2.24                      |
| 7/5           | 186         | <358.47                       | >2.62                     | 359.03                       | 2.69                      | 359.46                       | 2.47                      |
| 7/6           | 187         | <358.47                       | >2.62                     | 359.03                       | 2.69                      | 359.45                       | 2.48                      |
| 7/7           | 188         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 7/10          | 191         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 7/11          | 192         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 7/12          | 193         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 7/16          | 197         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 7/26          | 207         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 7/27          | 208         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 8/2           | 213         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 8/9           | 220         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 8/31          | 242         | <358.47                       | >2.62                     | 358.88                       | 2.84                      | 359.36                       | 2.57                      |
| 9/7           | 249         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 9/14          | 256         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 9/28          | 270         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 10/5          | 277         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 10/12         | 284         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 10/19         | 291         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 10/26         | 297         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 11/2          | 304         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 11/8          | 311         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 11/16         | 318         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 11/22         | 324         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 11/30         | 332         | <358.47                       | >2.62                     | <358.88                      | >2.84                     | <359.36                      | >2.57                     |
| 12/14         | 346         | 359.06                        | 2.04                      | 359.63                       | 2.09                      | 359.93                       | 2.00                      |
| 12/22         | 354         | 358.66                        | 2.44                      | 359.33                       | 2.39                      | 359.78                       | 2.15                      |

## APPENDIX

## WATER TABLE ELEVATIONS - MINER INSTITUTE - 1978

## FIELD - LAKE ALICE

| Calendar Date | Julian Date | WATER TABLE PIPES             |                           |                              |                           |                              |                           |
|---------------|-------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | LAWT-4                        |                           | LAWT-5                       |                           | LAWT-6                       |                           |
|               |             | Water Table Elevation (feet), | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 4/7           | 97          | Ice                           | -----                     | >362.19                      | <0.00                     | Ice                          | -----                     |
| 4/13          | 103         | >361.81                       | <0.00                     | 362.06                       | 0.13                      | >361.08                      | <0.00                     |
| 4/20          | 110         | 361.67                        | 0.14                      | 361.96                       | 0.23                      | >361.08                      | <0.00                     |
| 4/27          | 117         | 361.28                        | 0.53                      | 361.67                       | 0.52                      | 360.85                       | 0.23                      |
| 5/4           | 124         | 361.05                        | 0.76                      | 361.44                       | 0.75                      | 360.48                       | 0.60                      |
| 5/11          | 131         | 360.91                        | 0.90                      | 361.44                       | 0.75                      | 360.53                       | 0.55                      |
| 5/18          | 138         | 361.45                        | 0.36                      | 361.83                       | 0.36                      | 360.79                       | 0.29                      |
| 5/25          | 145         | 360.55                        | 1.26                      | 361.00                       | 1.19                      | 359.93                       | 1.15                      |
| 6/1           | 152         | 361.71                        | 0.10                      | 361.96                       | 0.23                      | 360.97                       | 0.11                      |
| 6/6           | 137         | 360.18                        | 1.63                      | 361.56                       | 0.63                      | 360.73                       | 0.35                      |
| 6/7           | 158         | 360.95                        | 0.86                      | 361.40                       | 0.79                      | 360.61                       | 0.47                      |
| 6/8           | 159         | 361.63                        | 0.18                      | 362.03                       | 0.16                      | 360.98                       | 0.10                      |
| 6/9           | 160         | 361.45                        | 0.36                      | 361.76                       | 0.43                      | 360.88                       | 0.20                      |
| 6/12          | 163         | 360.72                        | 1.09                      | 361.23                       | 0.96                      | 360.42                       | 0.66                      |
| 6/13          | 164         | 360.67                        | 1.14                      | 361.14                       | 1.05                      | 360.32                       | 0.76                      |
| 6/13          | 164         | 361.56                        | 0.25                      | 362.05                       | 0.14                      | 360.93                       | 0.15                      |
| 6/14          | 165         | 361.40                        | 0.41                      | 361.89                       | 0.30                      | 360.88                       | 0.20                      |
| 6/15          | 166         | 361.04                        | 0.77                      | 361.53                       | 0.66                      | 360.70                       | 0.38                      |
| 6/16          | 167         | 360.64                        | 1.17                      | 361.23                       | 0.96                      | 360.36                       | 0.72                      |
| 6/19          | 170         | 360.92                        | 0.89                      | 361.59                       | 0.60                      | 360.59                       | 0.49                      |
| 6/20          | 171         | 361.81                        | 0.00                      | 362.19                       | 0.00                      | 361.08                       | 0.00                      |
| 6/20          | 171         | 361.81                        | 0.00                      | 362.07                       | 0.12                      | 361.08                       | 0.00                      |
| 6/21          | 172         | 361.65                        | 0.15                      | 361.96                       | 0.23                      | 360.96                       | 0.12                      |
| 6/22          | 173         | 361.63                        | 0.18                      | 361.96                       | 0.23                      | 360.98                       | 0.10                      |
| 6/23          | 174         | 361.42                        | 0.38                      | 361.70                       | 0.48                      | 360.88                       | 0.20                      |
| 6/26          | 177         | 360.71                        | 1.10                      | 361.20                       | 0.99                      | 360.42                       | 0.66                      |
| 6/27          | 178         | 360.61                        | 1.20                      | 361.14                       | 1.05                      | 360.21                       | 0.87                      |
| 6/28          | 179         | 360.53                        | 1.28                      | 361.11                       | 1.07                      | 360.06                       | 1.02                      |

## APPENDIX

## WATER TABLE ELEVATIONS - MINER INSTITUTE - 1978

## FIELD - LAKE ALICE

| Calendar Date | Julian Date | WATER TABLE PIPES             |                           |                              |                           |                              |                           |
|---------------|-------------|-------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | LAWT-4                        |                           | LAWT-5                       |                           | LAWT-6                       |                           |
|               |             | Water Table Elevation (feet), | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 6/29          | 180         | 360.25                        | 1.56                      | 360.86                       | 1.33                      | 359.60                       | 1.48                      |
| 6/30          | 181         | 360.07                        | 1.74                      | 360.77                       | 1.42                      | 359.29                       | 1.79                      |
| 7/5           | 186         | <359.46                       | >2.35                     | 360.41                       | 1.78                      | <358.75                      | >2.33                     |
| 7/6           | 187         | <359.46                       | >2.35                     | 360.41                       | 1.78                      | <358.75                      | >2.33                     |
| 7/7           | 188         | <359.46                       | >2.35                     | 360.38                       | 1.81                      | <358.75                      | >2.33                     |
| 7/10          | 191         | <359.46                       | >2.35                     | 360.30                       | 1.89                      | <358.75                      | >2.33                     |
| 7/11          | 192         | <359.46                       | >2.35                     | 360.28                       | 1.91                      | <358.75                      | >2.33                     |
| 7/12          | 193         | <359.46                       | >2.35                     | 360.25                       | 1.94                      | <358.75                      | >2.33                     |
| 7/16          | 197         | <359.46                       | >2.35                     | 360.17                       | 2.02                      | <358.75                      | >2.33                     |
| 7/26          | 207         | <359.46                       | >2.35                     | 360.09                       | 2.10                      | <358.75                      | >2.33                     |
| 7/27          | 208         | <359.46                       | >2.35                     | 360.05                       | 2.14                      | <358.75                      | >2.33                     |
| 8/2           | 213         | <359.46                       | >2.35                     | 359.94                       | 2.25                      | <358.75                      | >2.33                     |
| 8/9           | 220         | <359.46                       | >2.35                     | 359.82                       | 2.37                      | <358.75                      | >2.33                     |
| 8/31          | 242         | 359.46                        | 2.35                      | 359.79                       | 2.40                      | <358.75                      | >2.33                     |
| 9/7           | 249         | <359.46                       | >2.35                     | 359.69                       | 2.50                      | <358.75                      | >2.33                     |
| 9/14          | 256         | <359.46                       | >2.35                     | 359.68                       | 2.51                      | <358.75                      | >2.33                     |
| 9/28          | 270         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 10/5          | 277         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 10/12         | 284         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 10/19         | 291         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 10/26         | 297         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 11/2          | 304         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 11/8          | 311         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 11/16         | 318         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 11/22         | 324         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 11/30         | 332         | <359.46                       | >2.35                     | <359.68                      | >2.51                     | <358.75                      | >2.33                     |
| 12/14         | 346         | 360.11                        | 1.70                      | 361.29                       | 0.90                      | 359.92                       | 1.16                      |
| 12/22         | 354         | 359.91                        | 1.90                      | 360.64                       | 1.55                      | 359.42                       | 1.66                      |

## APPENDIX

## WATER TABLE ELEVATIONS - MINER INSTITUTE 1978

## FIELD 3I-2

| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | 1                            |                           | 2                            |                           | 3                            |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 4/7           | 97          | 182.38                       | 0.04                      | > 182.30                     | < 0.00                    | Ice                          | -----                     |
| 4/13          | 103         | 181.78                       | 0.64                      | 181.80                       | 0.50                      | 170.36                       | 1.61                      |
| 4/20          | 110         | 181.24                       | 1.18                      | 180.92                       | 1.38                      | 170.08                       | 1.89                      |
| 4/27          | 117         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.76                       | 2.21                      |
| 5/4           | 124         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.46                       | 2.51                      |
| 5/11          | 131         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.86                       | 2.11                      |
| 5/18          | 138         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.80                       | 2.17                      |
| 5/25          | 145         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.72                       | 2.25                      |
| 6/1           | 152         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.98                       | 1.99                      |
| 6/6           | 157         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.95                       | 2.02                      |
| 6/7           | 158         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.92                       | 2.05                      |
| 6/8           | 159         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 170.05                       | 1.92                      |
| 6/9           | 160         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 170.03                       | 1.94                      |
| 6/12          | 163         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.87                       | 2.10                      |
| 6/13-1        | 164-1       | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.85                       | 2.12                      |
| 6/13-2        | 164-2       | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.87                       | 2.10                      |
| 6/13-3        | 164-3       | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.90                       | 2.07                      |
| 6/14          | 165         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.90                       | 2.07                      |
| 6/15          | 166         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.87                       | 2.10                      |
| 6/16          | 167         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.87                       | 2.10                      |
| 6/19          | 170         | < 180.63                     | > 1.70                    | < 179.90                     | > 2.40                    | 170.10                       | 1.87                      |
| 6/20          | 171         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 170.10                       | 1.87                      |
| 6/22          | 173         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 170.08                       | 1.89                      |
| 6/23          | 174         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 170.03                       | 1.94                      |
| 6/26          | 177         | < 180.63                     | > 1.79                    | < 179.90                     | > 2.40                    | 169.90                       | 2.07                      |

## APPENDIX D.

## WATER TABLE ELEVATIONS - MINER INSTITUTE 1978

## FIELD 3I-2

| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | 1                            |                           | 2                            |                           | 3                            |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 6/27          | 178         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | 169.87                       | 2.10                      |
| 6/28          | 179         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | 169.77                       | 2.20                      |
| 6/29          | 180         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | 169.69                       | 2.28                      |
| 6/30          | 181         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | 169.49                       | 2.48                      |
| 7/5           | 186         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 8/31          | 242         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 9/7           | 249         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 9/14          | 256         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 9/28          | 270         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 10/5          | 277         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 10/12         | 284         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 10/19         | 291         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 10/26         | 297         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 11/2          | 304         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 11/8          | 311         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 11/16         | 318         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 11/22         | 324         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 11/30         | 332         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 12/6          | 338         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | >2.61                     |
| 12/14         | 346         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | 169.71                       | 2.26                      |
| 12/22         | 354         | <180.63                      | >1.79                     | <179.90                      | >2.40                     | <169.36                      | 2.61                      |

## APPENDIX E.

## WATER TABLE ELEVATIONS - MINER INSTITUTE 1978

FIELD 3I-4

| Calendar Date | Julian Date | WATER TABLE PIPES            |                           |                              |                           |                              |                           |
|---------------|-------------|------------------------------|---------------------------|------------------------------|---------------------------|------------------------------|---------------------------|
|               |             | 3oW                          |                           | 0                            |                           | 3oE                          |                           |
|               |             | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface | Water Table Elevation (feet) | Feet Below Ground Surface |
| 4/7           | 97          | >183.57                      | <0.00                     | 183.49                       | -0.03                     | 182.88                       | 0.38                      |
| 4/13          | 103         | >183.57                      | <0.00                     | 183.40                       | 0.06                      | 182.76                       | 0.50                      |
| 4/20          | 110         | 183.31                       | 0.26                      | 183.27                       | 0.19                      | 182.66                       | 0.60                      |
| 4/27          | 117         | 181.40                       | 0.84                      | 182.70                       | 0.76                      | 182.48                       | 1.78                      |
| 5/4           | 124         | <181.40                      | 2.17                      | 182.17                       | 1.29                      | 182.03                       | 1.23                      |
| 5/11          | 131         | <181.40                      | >2.17                     | 182.20                       | 1.26                      | <181.00                      | >2.26                     |
| 5/18          | 138         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 5/25          | 145         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 6/1           | 152         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 6/6           | 157         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 6/7           | 158         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 6/8           | 159         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 6/9           | 160         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 8/31          | 242         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 9/7           | 249         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 9/14          | 256         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 9/21          | 263         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 9/28          | 270         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 10/5          | 277         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 10/12         | 284         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 10/26         | 297         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 11/2          | 304         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 11/8          | 311         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 11/16         | 318         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 11/22         | 324         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 11/30         | 332         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 12/14         | 346         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |
| 12/22         | 354         | <181.40                      | >2.17                     | <181.52                      | >1.94                     | <181.00                      | >2.26                     |



## APPENDIX F.

## TILE OUTFLOWS - MINER INSTITUTE - 1978

## FIELD 3I-1

| Calendar<br>Date | Julian<br>Date |             |             |             |              |
|------------------|----------------|-------------|-------------|-------------|--------------|
|                  |                | #3<br>(gpm) | #6<br>(gpm) | #9<br>(gpm) | #12<br>(gpm) |
| 6/7              | 158            | 0.16        | 0.47        | 0.16        | 0.12         |
| 6/8              | 159            | 0.54        | 1.51        | 0.65        | 0.76         |
| 6/9              | 160            | 0.36        | 1.02        | 0.41        | 0.44         |
| 6/12             | 163            | 0.25        | 0.62        | 0.22        | 0.23         |
| 6/13-1           | 164            | 0.21        | 0.55        | 0.21        | 0.23         |
| 6/13-2           | 164            | 0.21        | 0.58        | 0.22        | 0.24         |
| 6/13-3           | 164            | 0.19        | 0.61        | 0.22        | 0.21         |
| 6/14             | 165            | ----        | 0.55        | 0.18        | 0.18         |
| 6/15             | 166            | 0.20        | 0.49        | 0.16        | 0.20         |
| 6/16             | 167            | 0.15        | 0.43        | 0.13        | 0.15         |
| 6/19             | 170            | 0.11        | 0.41        | 0.14        | 0.13         |
| 6/20             | 171            | ----        | 5.28        | 3.17        | 3.17         |
| 6/21             | 172            | 1.98        | 4.53        | 1.98        | 2.88         |
| 6/22             | 173            | ----        | 2.64        | 0.88        | 1.87         |
| 6/23             | 174            | 0.91        | 1.76        | 0.51        | 1.22         |
| 6/26             | 177            | 0.36        | 0.79        | 0.25        | 0.56         |
| 6/27             | 178            | 0.28        | 0.93        | 0.21        | ----         |
| 6/28             | 179            | 0.22        | 0.57        | 0.18        | 0.35         |
| 6/29             | 180            | 0.17        | 0.53        | 0.16        | 0.32         |
| 6/30             | 181            | 0.11        | 0.47        | 0.12        | 0.25         |
| 7/5              | 186            | NF          | 0.18        | 0.02        | 0.08         |
| 7/6              | 187            | NF          | 0.14        | NF          | 0.06         |
| 7/7              | 188            | NF          | 0.13        | NF          | 0.03         |
| 7/10             | 191            | NF          | 0.04        | NF          | NF           |
| 7/11             | 192            | NF          | NF          | NF          | NF           |
| 8/31             | 242            | NF          | NF          | NF          | NF           |
| 9/7              | 249            | NF          | NF          | NF          | NF           |
| 9/14             | 256            | NF          | NF          | NF          | NF           |
| 9/21             | 263            | NF          | NF          | NF          | NF           |
| 9/28             | 270            | NF          | NF          | NF          | NF           |
| 10/5             | 277            | NF          | NF          | NF          | NF           |
| 10/12            | 284            | NF          | NF          | NF          | NF           |
| 10/27            | 298            | NF          | NF          | NF          | NF           |
| 11/2             | 304            | NF          | NF          | NF          | NF           |
| 11/11            | 313            | NF          | NF          | NF          | NF           |
| 11/16            | 318            | NF          | NF          | NF          | NF           |
| 11/22            | 324            | NF          | NF          | NF          | NF           |
| 11/30            | 332            | NF          | NF          | NF          | NF           |
| 12/14            | 346            | NF          | 0.32        | NF          | NF           |
| 12/22            | 354            | SB          | SB          | SB          | SB           |

Note: NF is no measureable flow  
 SB is snowbound outlets